

Iowa State University Technology Transfer Accomplishments: Highlights of Economic Development Activities

Iowa State University of Science and Technology is pleased to provide its report of accomplishments in technology transfer and economic development for the past year. As will be detailed in this report, this has been an outstanding year for our University in these areas with respect to our funding related to these activities as well as our interactions with businesses in the state. We have continued to expand the contribution of our technological expertise to the economic development of Iowa. In addition, we have participated in an unprecedented number of partnerships with the community, the state, and our research park to draw new businesses to our state. It should be noted that this report concentrates on technology transfer and economic development activities in the State of Iowa. It does not describe the many activities between ISU and non-Iowa entities, both across the U.S. and in many other countries.

It should be emphasized that one of Iowa State University's major contributions to Iowa's economy is the generation of technology-literate students for Iowa's workforce. On-campus as well as off-campus opportunities for educating professionals throughout the state are increasing annually. These programs are reported to the Board of Regents, State of Iowa through summaries of our program and accreditation reviews and, consequently, will not be reiterated here.

The report is organized consistent with Iowa State University's current strategic plan. In fact, it characterizes the very essence of this vision. Our strategic plan emphasizes three highly critical missions for a land-grant institution: discovery, the research and scholarship generated by students and faculty; learning, the active process underlying the educational missions of the university; and engagement, the interactions between the University and the communities and citizens of the State. Critical to the strategic plan is the fact that these three missions intersect. The success resulting from these intersections are key to achieving our overall objective: becoming the best land-grant university in the country. This report presents the successes resulting from the intersections between discovery and engagement: the translation of the research developments at the University to applications that benefit the economic development and well-being of our state. The major achievements in research funding and technology transfer are highlighted with a number of specific examples illustrating how these accomplishments have resulted in benefits to our communities and businesses in the state.

Iowa State University
Technology Transfer Accomplishments:
Highlights of Economic Development Activities

Executive Summary for 2001 Annual Report

- ISU is one of the nation's leading universities in technology transfer accomplishments. In the last survey conducted by the Association of University Technology Managers, ISU ranked 16th in the number of patents earned, 14th in invention disclosures received, 4th in licenses and options yielding income, and 2nd in licenses and options executed on its intellectual property.
- ISU hit an all-time high in FY01 in sponsored funding. \$217.7 million was received from both federal and non-federal sources. Of this amount, \$14.9 million was received from businesses and commodity groups for research activities and \$10.7 million for non-research activities, including many projects that provide technical support and outreach to companies in the State of Iowa.
- ISU researchers disclosed 115 new inventions to the Iowa State University Research Foundation (ISURF), and 33 new patents were issued to ISU inventors.
- ISURF signed 216 new licenses and options for ISU technology, including 185 for plant germplasm. Thirty-three technologies were licensed for the first time in FY01.
- Technologies licensed to Iowa companies (not including plant germplasm) resulted in over twelve million dollars of sales by those companies in 2000.
- ISU received another R&D 100 Award in FY01. This brings the total of these awards received by ISU since 1984 to 23, placing ISU second among all universities. In addition, an ISU faculty member received an R&D 100 Award in FY01 as a result of a submission made directly by his company (a spin-off company based on ISU technology).
- ISURF completed license agreements with three Iowa-based startup companies in FY01, two of which are faculty start-ups.
- Seven new companies began operations in the ISU Research Park in FY01, bringing the total to 116 companies and research centers that have located in or been affiliates of the Research Park. Fifty of those companies are still associated with the Park and employ nearly 800 people; 29 have expanded or relocated elsewhere; 12 have been folded into other organizational structures; and 25 failed. Fourteen former Research Park tenants and affiliates are still doing business in Iowa, taking the total Research Park-impacted employment to nearly 1,400 people within the state. The total number of employees worldwide exceeds 1,600.
- The total square footage within the Research Park is now over 260,000 square feet. All 41 acres of the Phase I land development are sold and occupied and six acres in the Phase II land development are already assigned. Two new projects are planned for this fall that will occupy another nine acres.
- The ISU Pappajohn Center for Entrepreneurship and the Small Business Development Center (SBDC) provided 4,500 hours of business counseling to technology-based companies during FY01; they are currently working with about 40 technology companies.

- During FY01, ISU received \$500,000 from the Iowa Department of Economic Development (IDED) for a three-year initiative called the Technology Commercialization Acceleration Program. This program will seek to aggressively commercialize university research in the State of Iowa.
- The Iowa Demonstration Laboratory (IDL) completed 53 projects with Iowa companies in FY01 using nondestructive methods to evaluate materials. One of those projects resulted from a coordinated effort between IDL and the Iowa Manufacturing Extension Partnership in which *Introduction to NDE* seminars were held across the State. A northwest Iowa company that manufactures rotationally molded components contacted IDL after attending the workshop for assistance. As a result, the company is using new quality measures to improve product satisfaction and believes that these new inspection methods will positively impact their market share.
- The Iowa Companies Assistance Program (ICAP) had over 100 projects with Iowa companies this past year. In one case, ICAP helped a manufacturer of pickup reels for combines track down and fix a quality problem. As a result, the company was able to keep a single client that was worth about \$750,000 annually in revenues to their business.
- In FY01, the Iowa Manufacturing Extension Partnership (IMEP) helped Iowa businesses and manufacturers create and retain over 200 jobs. IMEP's efforts also led to sales being increased by \$11 million, cost savings totaling \$1 million and additional investments exceeding \$4 million.
- The Center for Advanced Technology Development (CATD), through the Iowa Industrial Incentive Program (IIP), links Iowa manufacturers with the resources of ISU and the University of Iowa to enhance the economic competitiveness of Iowa industry. In FY01, CATD implemented 34 cost-shared contracts leveraging the State's \$329,500 investment in the IIP program with companies' investments of \$691,000. One of these projects brought together ISU chemists and a fuel cell expert from the U of I to help a manufacturer of computerized breath-alcohol ignition devices. The results brought the company significant savings in production costs because they found a way to produce fuel cells in-house for less than 40% of the cost of commercial cells.
- A "Point of Contact" system was established in March 2001 to help companies find the assistance they need within the university. The university homepage has a link for business/industry that takes the reader to the "Point of Contact" information. Since the system was implemented, the Office of the Vice Provost for Research has handled about fifteen inquiries a week. Inquiries have included requests from Iowa manufacturers for technical assistance, requests for information on special courses/workshops and requests for results of specific research projects.
- ISU, the IDED and the University of Northern Iowa (UNI) participated in a joint "road show" presentation at Cedar Falls to a conference sponsored by the Cedar Valley Manufacturers Association and the Iowa Northland Regional Council of Governments. Presentations were given by ISU's Vice Provost for Research, Vice Provost for Extension, and Director of IPRT; the director of IDED; and a representative from UNI that focused on what each organization offers in regard to business/industry assistance. In addition, testimonials from local Cedar Falls businesses were given in regard to their interactions with ISU.
- During this past year, ISU partnered with IDED, the Ames Economic Development Commission and/or the Greater Des Moines Partnership on five specific economic development initiatives in which companies were being recruited to Iowa. The Mid American Energy Group also was involved in one of those initiatives.

Outline

I. Goal: Strengthen discovery and innovation on campus related to technology development and economic development. (Based on Goal 2 of the ISU Strategic Plan for 2000-2005)

- a. Enhance overall support for research and development on campus.
- b. Encourage the development of intellectual property that has the potential for generating patent applications and license agreements.
- c. Encourage the development of research collaborations with other Regent's universities and industrial partners that will increase and broaden the scope of intellectual property developed at the university.

II. Goal: Engage with key constituents through synergistic partnerships to stimulate technology transfer and economic development. (Based on Goal 3 of the ISU Strategic Plan for 2000-2005)

- a. Promote programs that stimulate economic development by assisting new or established companies through university partnerships that provide technical, financial, or other assistance.
- b. Heighten efforts to ensure the results of ISU research and technology are used for public benefit.
- c. Enhance the growth of the Research Park.
- d. Continue to develop and implement programs that interface ISU graduate and undergraduate students with Iowa companies and communities.
- e. Emphasize efforts to partner and build relationships with constituents and stakeholders by participating on committees, commissions, etc., that foster an awareness of as well as address the needs of communities and businesses.
- f. Build partnerships with state and local agencies in an effort to enhance a broad range of economic development efforts.

Acronyms In This Report

CATD - Center for Advanced Technology Development
CIRAS - Center for Industrial Research and Service
CNDE - Center for Nondestructive Evaluation
CTRE - Center for Transportation Research and Education
ICAP - Iowa Companies Assistance Program
ICN - Iowa Communications Network
IDED - Iowa Department of Economic Development
IDL - Iowa Demonstration Laboratory
IEC - Iowa Energy Center
IICAB - Institute for International Cooperation in Animal Biologics
IIP - Iowa Industrial Incentive Program
IMEP - Iowa Manufacturing Extension Partnership
IPRT - Institute for Physical Research and Technology
ISIS - Iowa State Innovation System
ISURF - Iowa State University Research Foundation
ISURP - Iowa State University Research Park
LTAP - Local Technical Assistance Program
OSPA - Office of Sponsored Programs Administration
SBDC - Small Business Development Center
UI or U of I - University of Iowa
UNI - University of Northern
VRAC - Virtual Reality Applications Center

The Coordinating Council on Technology Transfer (CCOTT) was formed in January 1993 and coordinates all ISU technology transfer activities. Representatives from technology transfer units and each of the colleges meet regularly to discuss problems, update each other on activities, assess the state and national environment for technology transfer and propose policy and procedures to encourage technology transfer. Current membership includes:

Steve Andrie
*Center for Transportation Research and Education
(CTRE)*

Tim Borich
College of Design

Willem Bakker
Iowa Manufacturing Extension Partnership (IMEP)

Floyd Barwig
Iowa Energy Center

James Bloedel (Chair)
Vice Provost for Research

Steven Carter
*Pappajohn Center for Entrepreneurship/
ISU Research Park*

Ron Cox
Center for Industrial Research and Service (CIRAS)

Walter Fehr
Biotechnology

Joseph Gilbert
*Institute for Physical Research and Technology
(IPRT)*

Robert Harris
*Center for Advanced Technology Development
(CATD) & Ames Laboratory*

Stephen Howell
Plant Sciences Institute

Kenneth Kirkland
*Office of Intellectual Property and Technology
Transfer (OIPTT) & Iowa State University Research
Foundation (ISURF)*

Wolfgang Kliemann
Research Administration

Sonja Klocker
Research Administration

Mark Laurenzo
*Center for Advanced Technology Development
(CATD)*

Lisa Lorenzen
Biotechnology Industrial Liaison

Ronald Manning
*Small Business Development Center (SBDC) &
College of Business*

Sreeparna Mitra
Governmental Relations

Theodore Okiishi
College of Engineering

Donald Reynolds
College of Veterinary Medicine

Steve Rodermel
College of Liberal Arts & Sciences

Roger Smith
College of Education

Joel Snow
*International Institute of Theoretical and Applied
Physics (IITAP)*

Mary Winter
College of Family and Consumer Sciences

Wendy Wintersteen
Agriculture and Home Economics Experiment Station

Iowa State does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, sex, marital status, disability, or status as a U.S. Vietnam Era Veteran. Inquiries can be directed to the Director of Affirmative Action, 318 Beardshear Hall, (515) 294-7612.

I. Goal: Strengthen discovery and innovation on campus related to technology development and economic development

a. Enhance overall support for research and development on campus.

Sponsored Funding

In FY01, \$217.7 million was received by ISU in sponsored funding, a record high. See Figure 1.

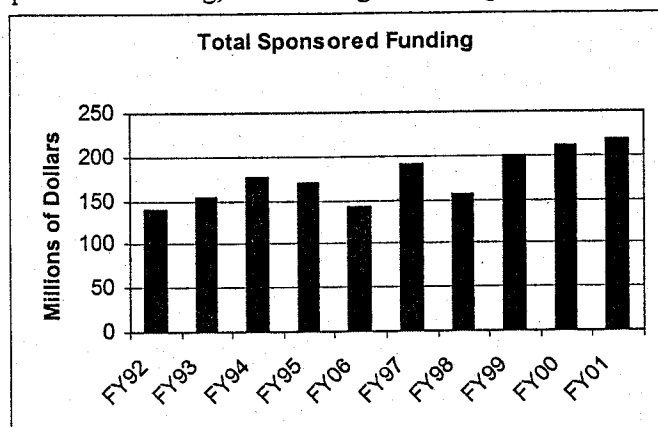


Figure 1

\$133.3 million of this was dedicated to research activities and the rest to public service, educational projects, financial aid and buildings. See Figure 2 for sponsored research funding.

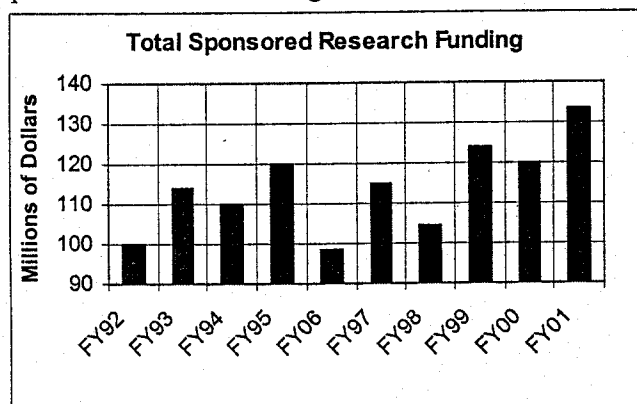


Figure 2

These research awards include contracts and grants from both federal and non-federal sources. Many projects supported by these funds result in technology that is transferred to the marketplace and consequently assists companies and communities across Iowa. The following two graphs show the two major sources for this type of support – the federal government and

businesses and commodity groups. In FY01, the federal government funded 561 research projects totaling \$93.8 million. See Figure 3.

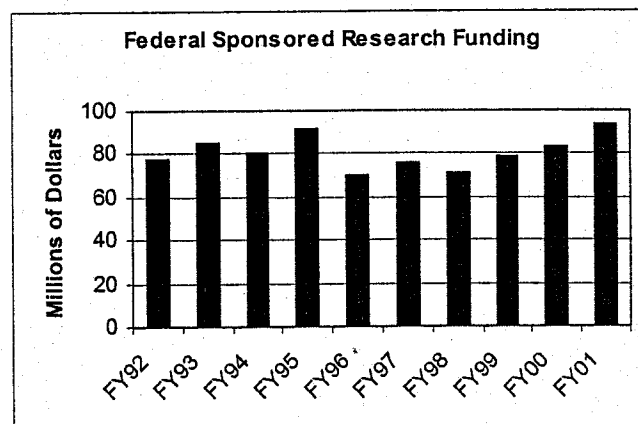


Figure 3

As shown below in Figure 4, in FY01 businesses (including commodity groups) funded 429 research projects at ISU totaling \$14.9 million. In addition, businesses funded 82 non-research projects totaling \$10.7 million (not shown in Figure).

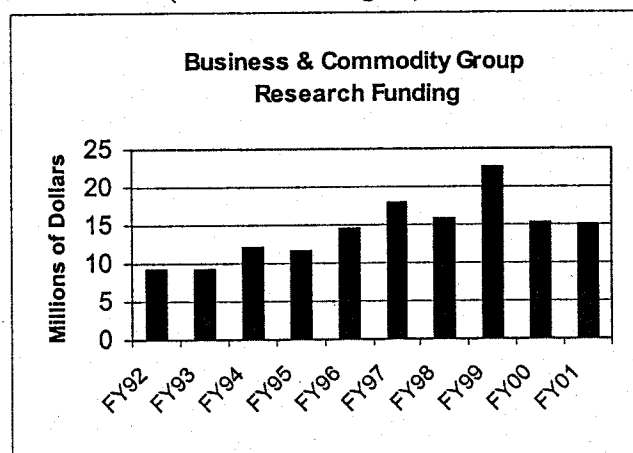


Figure 4

Contracts and Agreements Between Industry and University

The biotechnology industrial liaison reviewed or negotiated more than 100 contracts with industries around the world in collaboration with the Office of Sponsored Programs Administration (OSPA) and the Iowa State University Research Foundation. These contracts fostered an exchange of information and support for research for more than 50 faculty and staff members in six colleges at the university.

IPRT Seed Funding Program

The Institute for Physical Research and Technology (IPRT) seeks interdisciplinary projects that address

research areas that have the potential to impact on Iowa's economic development. In FY01, IPRT awarded nearly \$90,000 for two new projects with another \$117,000 going to fund five second-year projects. One of these projects investigates cis-linked aptamer microanalytical probes (CLAMPS). These probes have revolutionized the pharmaceutical industry's approach to drug discovery. Instead of making one compound at a time, the combinatorial approach generates a mixture of hundreds or thousands of compounds from which a compound with the desired characteristic can be selected. With support from IPRT Research Seed Funding Program, a team of ISU researchers is working to develop combinatorial technologies and methods in chemistry and molecular biology for microanalysis and remediation in the area of heavy metals. The project is now attracting public and private funding that will assist in establishing ISU as a leader in this emerging field and quite likely will influence the start-up of companies here.

Industry/University Cooperative Research Program in Nondestructive Evaluation

The Center for Nondestructive Evaluation (CNDE) continued its strong core research program in nondestructive evaluation, supported by 22 companies and government agencies. Among the important technical advances were new programs in phase array ultrasonics, new techniques to characterize the fiber orientation at a buried interface in a composite material, and an improved understanding of the effects of machining-induced roughness on ultrasonic signals, information that will be used to specify acceptable machining conditions.

Ames Laboratory Integral to ISU Research Efforts

Ames Laboratory continues to play a key role in ISU's overall research effort. Ames Laboratory researchers continue to be at the cutting edge of technology in a number of fields as the following briefs illustrate:

Discoveries on Energy 100 List—Three Ames Laboratory discoveries were included in the Department of Energy's recognition of "100 most outstanding scientific and technological accomplishments in DOE history." Laboratory work in photonic bandgap structures, lead-free solder, and magnetic refrigeration were recognized.

Turning Magnetic Scrap into a Valuable Resource—Ames Laboratory researchers refined a process that makes it commercially viable to recover

neodymium from stockpiled magnetic scrap. The process uses molten magnesium to leach the neodymium from iron-boron-neodymium magnets. These powerful rare-earth magnets are widely used in electronics, automotive, and medical applications. The resulting magnesium-neodymium alloy is valuable to the magnesium casting industry and the remaining iron-boron waste can be recycled as well.

Biosensors Help Detect Cancer Risks—Ames Laboratory researchers developed a unique biosensor technology that provides immediate information about DNA damage from carcinogens, easing the process of determining an individual risk of getting cancer. IPRT's Microanalytical Instrumentation Center was also involved in this research.

Noninvasive Method for Detecting Defective Artificial Heart Valves

The reputation of the Center for Nondestructive Evaluation in the field of eddy current (electromagnetic testing) research has led to CNDE and ISU partnering with Vanderbilt University to develop a noninvasive method for detecting defects in the Bjork-Shiley Convexo-Concave heart valve. This widely used artificial replacement valve has been subject to life-threatening failure under certain conditions, but there has not been a suitable method to detect if a particular valve is prone to failure. The expanded project, funded by an award from the Bowling/Pfizer Heart Valve settlement fund, came about after the trustees of the fund selected the CNDE/Vanderbilt program out of a number of initial proposals submitted.

Lactic Acid Recovery from Cornstarch

Iowa State researchers developed a specialized bioreactor to produce and recover lactic acid from cornstarch. High-purity lactic acid is a must for the production of plastic polymers. ISU's bioreactor is advantageous in that the broth and resulting acid are relatively free of dead bacteria and similar unwanted by-products. The ISU research resulted in polylactic acid (PLA) biodegradable plastic formulations tested in bag and rope products regularly used in Latin American banana production systems. This resulted in a new commercial market for PLA.

Plant Sterol Supplemented Meat Lowers Cholesterol

Food scientists collaborated with a major Midwest food company on a project to evaluate the effectiveness of plant sterol-supplemented lean ground beef to lower serum cholesterol levels in

hypercholesterolemic young men. Results demonstrated that daily consumption of plant sterols in lean ground beef effectively lowered serum cholesterol and low-density lipoprotein cholesterol (LDL) in young men with elevated cholesterol levels. The significance of these results is that cholesterol-lowering plant sterols can be successfully incorporated into nutritious foods other than just margarine and mayonnaise. Based on this study, the company may introduce new products in 2001.

Labor Market Trends in Pork Industry

Iowa State and the University of Minnesota cooperated with the National Pork Producers Council to produce a series of reports on the state of the labor market in the pork industry. They documented trends toward increasing use of hired farm labor as operation sizes have been rising. In addition, the sector has been increasing the use of educated labor as farms have introduced new technologies. All the reports were published in *National Hog Farmer*.

ISU Expert Assists Start-Up Aquaculture Operation

An animal ecologist has provided technical assistance to a group of start-up aquaculture operations near Manning that now includes three operators who are raising walleye and rainbow trout. A feasibility analysis; design, layout and operational expertise; and water quality control are among the areas of expertise provided.

Development of Low Cost Plant Design

Iowa State faculty assisted a joint venture company based in Iowa and Kansas in developing a low-cost process and plant design to produce methyl soyate. The Center for Crops Utilization Research also solved quality control problems during plant start-up. The company has several product lines of environmentally friendly solvents, cleaners and lubricants, as well as production of biodiesel, and has recently completed a methyl soyate production facility expansion at its facility in northern Iowa.

Advanced Training for Swine Producers

Swine producers wanted advanced training in reproductive management, so four one-day seminars and one two-day program were offered by Iowa State and the University of Nebraska. Nearly 250 people attended the seminars—held at five locations around Iowa—and more than 40 attended a workshop session during the second day of the two-day program.

Lake and Watershed Management for Government and Private Sector

Lake-based recreation is a multi-million dollar industry in Iowa and throughout the Midwest. Economic yields of high-quality water resources are on the order of \$20-\$50k per acre per year. An Iowa State research group has been developing lake and watershed management plans over the last three years. The plans blend traditional and original technology to reduce nutrient pollution on a large scale. These plans are being transferred to the government and private sector for implementation. In Clear Lake, Iowa, study results are being used to develop plans for a \$15-\$30 million project, with much of the work being performed by private consulting and engineering firms.

b. Encourage the development of intellectual property that has the potential for generating patent applications and license agreements.

Disclosures of Inventions

ISU researchers disclosed 115 new inventions to the Iowa State University Research Foundation (ISURF). Figure 5 below shows disclosures received over the past ten years by discipline.

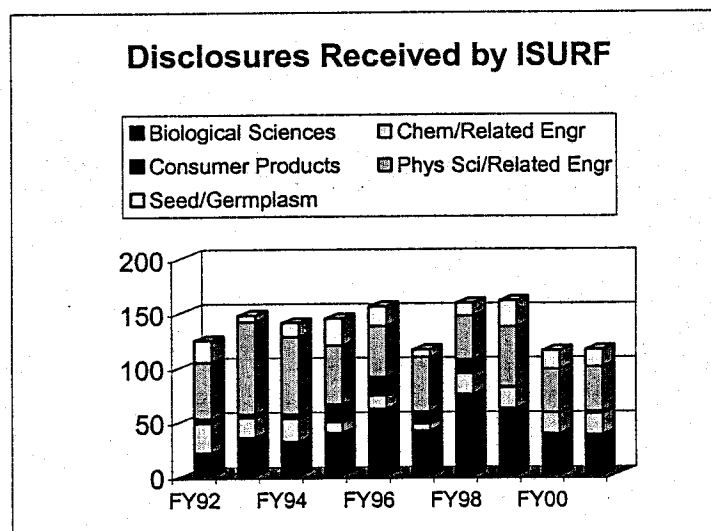


Figure 5

Patents Issued to ISU Inventors

About one third of new disclosures finally result in a patent. ISU is typically among the top fifteen universities in the number of patents issued each year. See Figure 6 for patents issued over the last ten years. The trend in this graph is the result of greater selectivity being used in determining which

technologies are likely to be marketable before patents are filed.

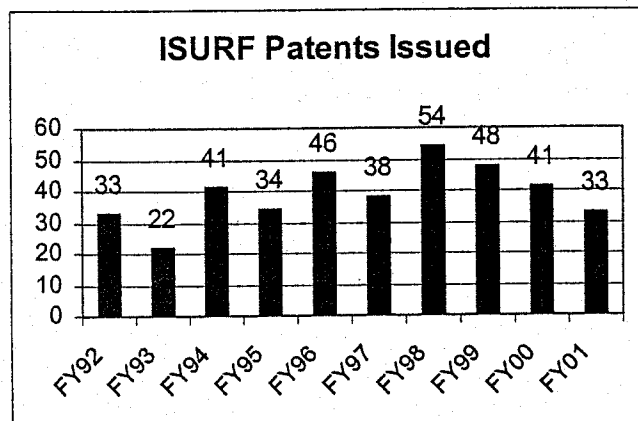


Figure 6

Iowa State's Research Foundation Signs New Licenses

Iowa State University contributes to the diversity of Iowa's economy through the invention and licensing of new technologies, many to Iowa companies. In FY01, 216 new licenses and options were signed, including 185 for plant germplasm. This is a critical statistic since it characterizes the actual transfer of ISU technologies to the marketplace. It should be noted that thirty-three inventions were licensed for the first time in FY01. Of these, 14 are plant varieties and 19 are other technologies. Figure 7 shows the number of active license and option agreements over the past ten years.

ISU Ranked High Nationally

ISU is one of the nation's leading universities in research accomplishments. In the last survey conducted by the Association of University Technology Managers, ISU ranked 16th in the number of patents earned, 14th in invention disclosures received, 4th in licenses and options yielding income, and 2nd in licenses and options executed on its intellectual property.

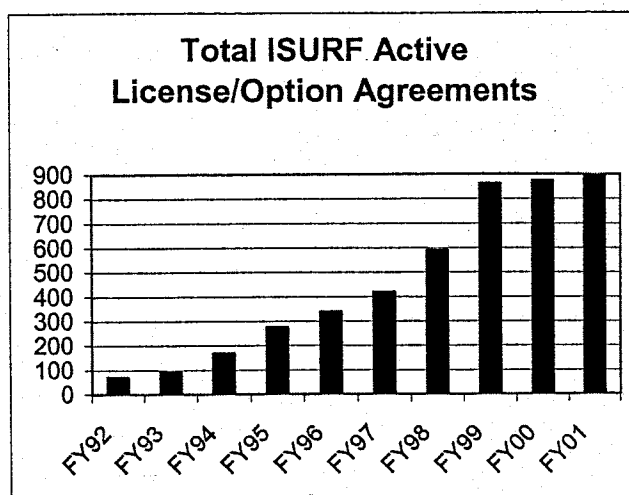


Figure 7

ISU Technology Generates Iowa Sales

New technologies originating at ISU contribute directly to the economy of Iowa. Technologies licensed to Iowa companies, excluding plant germplasm, resulted in \$12 million in sales by those companies in calendar year 2000. Figure 8 shows both Iowa and non-Iowa sales of licensed ISU technologies during the last nine calendar years. Sales of ISURF-licensed technologies (not including plant germplasm) were \$72 million in calendar year 2000, compared with \$24 million in calendar year 1999. Because of this marked overall increase, sales of licensed technologies by Iowa companies at \$12 million declined from 52% to 17% of the total.

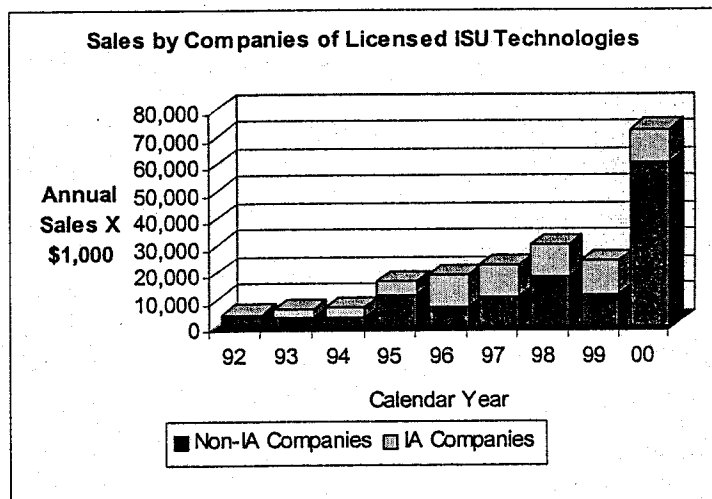


Figure 8

The next graph (Figure 9) shows the pattern over the past nine years of only Iowa companies.

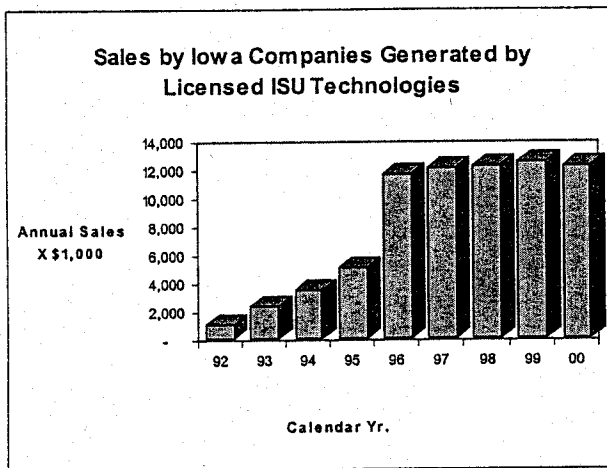


Figure 9

Making New Plant Germplasm Available

Figure 10 below shows the number of bushels of soybeans on which royalties were collected and the dollar amount of those royalties. In FY01, 26,173 bushels of specialty soybean varieties developed at ISU were planted in Iowa, generating \$68,364 in royalties.

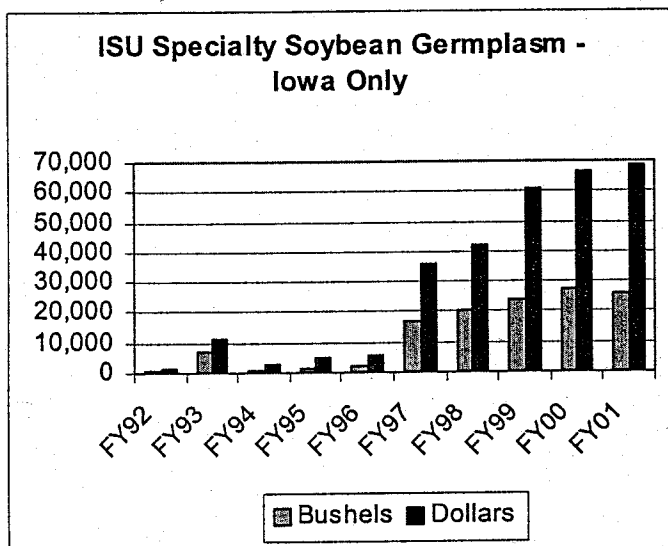


Figure 10

R&D Magazine Award

This year, one technology was submitted for an R&D 100 award by the Ames Lab and was successful. This award brings Iowa State's total to 23 since 1984, placing us second among all universities. The winning technology, invented by Dr. Ed Yeung, is a multiplexed capillary electrophoresis system using absorption detection. The invention makes it possible to rapidly separate samples of complex chemical or biochemical mixtures. Applications include DNA sequencing, combinatorial chemistry, and proteomics.

The technology has been licensed to CombiSep, an ISU faculty startup.

Encouraging the Development of Intellectual Property

In FY01, ISURF funded nine ISU inventor projects for a total of \$182,000. Most of these technologies are the subject of patent applications and are being actively marketed and licensed.

Researchers Discover Mutations in Gene that Affect Meat Quality

Pig molecular geneticists continue to find genes with large effects on growth, backfat and meat quality. Last year's discovery of the MC4R gene is being commercialized quickly by the world's major breeding company, Pig Improvement Company (PIC), and is being sold to producers in the United States and abroad. This commercialization follows previous commercialization of three reproductive genes (ESR, PRLR and RBP4). This year researchers discovered a set of mutations in a new gene affecting meat quality. These mutations are widespread in many pig breeds, and selection for the preferred combination of these could have significant effects on pork quality industry wide with improvements over 100 million dollars annually. Additional licenses have been signed and commercialization is expected in FY02.

New Technology to Aid Diagnosis of Disease

Molecular Express, Inc., an Ames company led by an Iowa State faculty member, recently received an NIH grant to develop a new procedure for detecting nucleic acid sequences in vitro. The University has taken out a provisional patent on the technology, and it is anticipated that this line of research will lead to technology that will be useful in diagnosing disease states that involve changes in gene expression. Such diseases include many inflammatory diseases and cancer. Faculty members from two departments are involved in the research.

Compounds that Attract Beneficial Insects

Entomologists isolated and identified two volatile plant compounds that attract beneficial insects such as ladybeetles and lacewings. These compounds are part of a pending patent application to the U.S. Patent Office. A startup company based at the ISU Research Park developed a long-lasting dispenser that can be hung in gardens and in field crops to attract lacewings and ladybeetles to enhance biological control of aphid and other pest insects. The company negotiated a license agreement with ISURF to market these

dispensers, and in 2001, "Gardens Alive!," one of the largest catalog and web-catalog biological-control-oriented companies in the world, signed an exclusive distribution agreement with it to market the dispensers as the product "Benallure." The first sales were made this year, with encouraging initial sales numbers. Further experiments have continued documenting the impact of the lures in enhancing biological control against several pest species, including the European corn borer.

Adaptable Method Controls Dry Period Mastitis in Cows

ISU animal scientists developed a simple adaptable approach to controlling dry period mastitis (which accounts for 50% or more of the disease and its economic losses), and a potential lower risk alternative to dry cow therapy antibiotics. The researchers developed a synthetic, persistent, breathable skin that can be applied by dipping animals teats at dry off and prior to calving. Field trials showed significant reductions of major pathogens that cause mammary infection. The dip was equivalent to dry cow antibiotic therapy in preventing new infections during the early dry period. This research provides a simple, innovative, cost effective way to prevent dry period mastitis, as well as a more economical, lower risk (both animal trauma and antibiotic residue potential) alternative to antibiotic therapy. The research has culminated in 4 patents (2 U.S. and 2 international), 5 international patents pending, and licensing and commercialization of the technology in 1999 with use in 20+ countries around the world.

c. Encourage the development of research collaborations with other Regent's universities and industrial partners that will increase and broaden the scope of intellectual property developed at the university.

New Partnerships Form

Six new research collaborations were formed this past year between scientists at ISU and the University of Iowa that have potential for intellectual property. Other types of collaborations (some ongoing) are described in the rest of this section.

ISU and the University of Iowa Team Up in Bioinformatics

The Laurence H. Baker Center for Bioinformatics and Biological Statistics, one of the Plant Sciences Institute centers, has been working to develop research collaborations with scientists at the University of Iowa. The Iowa State bioinformatics group is one of the top in the nation with regard to plant and animal genomics. Collaboration with researchers at the University of Iowa, especially in the medical school, has the potential to broaden the scope of bioinformatics research at ISU to include human genomics problems. At the same time biomedical researchers at the University of Iowa will benefit from access to the bioinformatics researchers at Iowa State.

To facilitate this collaboration the Baker Center has co-sponsored the Iowa State University/University of Iowa Joint Bioinformatics Workshop. The inaugural workshop was held November 2000 in Iowa City with more than 120 researchers from ISU, UI, and Iowa companies. A second workshop was held September 2001 in Ames. It is noteworthy that researchers from a number of Iowa companies (including Pioneer/Dupont, Garst, NewLink Genetics) have been attending the workshops.

Developing Broader Research Relationships

The biotechnology industrial liaison hosted ten high-level visits aimed at increasing the connections between industry and university beyond individual industry-faculty connections. Five of these visits were with Iowa-based companies and all have led to further discussions about possible collaborations.

Corn Rootworm Damage Prevention

One way to reduce corn rootworm damage is to prevent egg laying by beetles. This includes monitoring beetle density and applying an insecticide mixed with bait only when beetle numbers reach the treatment threshold. The bait uses 1/10 the typical rate of insecticide. Using the model to predict when egg laying would begin allowed management of the beetle with only five visits to each field, compared with 8-10 visits previously. The ISU research demonstrated that a lure trap available from Trece Incorporated can be used as a sentinel trap to forecast critical stages in the lifecycle of the corn rootworm. A private crop consulting firm was shown how the traps and model can be used to reduce their sampling of customers' fields. The cost reduction will make adult-beetle management cost competitive with soil insecticides applied in the spring for larval control.

Industrial Advisory Board Discusses Technology Transfer

At the November and April meetings of IPRT's Industrial Advisory Board, technology transfer dominated the discussions. The general consensus was two-fold: 1) industry-university relationships are critical in building a strong national research and development base and 2) ISU and boards such as IPRT's advisory board should explore further the opportunities and challenges to industry-university research and development collaborations. The November meeting included a talk by Iowa Department of Economic Development Director C. J. Niles who highlighted recent state initiatives in the New Economy, stressing the critical importance of university research in this effort. Research and development executives from the following companies serve on the IPRT board, which meets twice a year: General Motors, Pratt & Whitney, Boeing, Deere & Company, Ernest & Young, Gillette Company, Delta Airlines, Rockwell Science Center, Dow Corning, ALCOA, Micron Technologies, and Coca-Cola Company.

ISU Protocol Improves Production

ISU researchers developed a protocol for the production of organically bound selenium and chromium for an Iowa company. The company now uses this protocol for the production of selenium yeast in their industrial scale fermentors to be sold as an animal feed enhancer. They also recently confirmed that ISU-developed protocol produces mainly selenomethionine.

3D Ultrasound Imaging for Evaluation of Arteriosclerosis Risk-ISU/UI of I Partnership

With a grant from the Roy J. Carver Charitable Trust, researchers at the Center for Nondestructive Evaluation (CNDE) collaborated with physicians at the UI in applying 3D ultrasonic imaging techniques to evaluate patients for the risk of arteriosclerosis before the onset of the coronary artery disease. The research developed a system for scanning carotid and brachial arteries and methods for using the data to measure arterial wall thickness, and created a 3D visualization of the vessel structure. Given that cardiovascular disease remains one of the leading causes of the death in the U.S., the researchers hope that improved prediction methods and early identification of patients at risk will lead to improved therapies for prevention and cure.

ISU Research Contributes to USDA Dietary Guidelines

An ISU scientist collaborated with scientists from The Procter & Gamble Nutrition Science Institute and The Ohio State University to show that the amount of fat in fat-modified salad dressings can be limiting in the absorption of beta-carotene and other carotenoids in salads. Subjects consumed fresh vegetable salads with Italian salad dressings that differed only in the amount of vegetable oil that they contained (0 g, 6 g, and 28 g). By measuring the appearance of carotenoids in the blood of the subjects, they found there was little or no absorption of carotenoids when the salads were ingested with fat-free salad dressing, while the absorption was twice as great when the salads were ingested with full-fat as compared with reduced-fat salad dressing. The conclusion was that diets that are extremely low in fat may be counterproductive in terms of deriving the full benefit of cancer, vision, and heart-protective substances (carotenoids) from fresh vegetables. The research supports and will contribute to the appropriate application of the U.S. Department of Agriculture's Dietary Guideline, "Choose a diet that is low in saturated fat and cholesterol and moderate in total fat."

Soybean Cyst Nematode Awareness Efforts

The soybean cyst nematode (SCN) is the most serious pest affecting soybeans in the United States, responsible for yield losses in excess of \$1 billion and an estimated decrease of 20 percent in Iowa soybean yields. Significant yield loss can occur in the absence of obvious symptoms. Research and extension personnel from 12 land grant universities, 12 state soybean commodity organizations, and eight major soybean seed companies, formed the SCN coalition to develop and deliver information about SCN biology and management. Grower surveys indicate that awareness of SCN was greatly increased and SCN losses were significantly reduced. Requests for SCN soil tests (the first step in a management program) more than doubled in Iowa and other states involved in the project. The number of soybean growers actively managing SCN through the use of crop rotations and resistant soybean varieties has increased by 25%.

ISU Helps Form Telecommunications Alliance

An ISU faculty member has helped a Manning-based multi-community organization interested in economic development via telecommunications. Manning is one of the few rural communities to organize its own phone company with interconnections through a power cooperative and independent long distance provider.

The faculty member recommended the creation of an alliance of community and business leaders, citizen users, and telecommunications providers from across the state and suggested goals for such an alliance. The alliance concept was included in the Enterprise Iowa report prepared for the Iowa Department of Economic Development. Governor Vilsack picked the concept out of the report and approved efforts to initiate and organize an "Advanced Telecommunications Alliance" with staff support from the Iowa Department of Economic Development.

ISU Joins Multistate Effort to Build Rural Capacity

Sociology staff joined staff from four other Midwestern states to work on projects to build rural capacity to meet immigration-related challenges. Publications from the effort focus on physical and social infrastructure needs. Iowa's Departments of Agriculture and Land Stewardship, Education, Human Services, Public Health, Public Safety, Transportation, Workforce Development, Revenue and Finance, the State Library of Iowa, and the offices of the State Treasurer and the Secretary of State are involved. Federal partners are the Bureau of the Census in the U.S. Department of Commerce, the Bureau of Economic Analysis in the U.S. Department of Labor, two U.S. Bankruptcy Courts, and the U.S. Department of Veterans Affairs.

Networking for Women Landowners

Faculty members in sociology worked with the Women, Food and Agriculture Network (WFAN) to offer learning and networking opportunities for women landowners to improve their land management decision making processes and practices.

Develop Machine Learning Methods

A professor in the Department of Mathematics collaborated with Integrated DNA technologies of Iowa City to develop machine learning methods to improve the design of PCR primers, which are reagents used in the basic and applied life sciences to fish out DNA sequences of interest (such as genes).

Increase Oil Recovery or Remediate Groundwater Contamination

A professor in the Department of Geological and Atmospheric Sciences has collaborated with Etrema Products, Inc. (ISU Research Park) to develop a method to enhance fluid flow in oil reservoirs and aquifers using acoustic waves. This technique can be

used to increase oil recovery or promote the remediation of groundwater contamination.

Journalism Collaboration

Another notable example of collaboration between ISU and other Regent's institutions is the founding of the Iowa College Media Association. The Association was organized this past year through the efforts of several Greenlee School faculty and it is composed of representatives from nearly 20 university (Regent's and private) and community colleges. The organization is dedicated to educating Iowa's future journalists and broadcasters and has the potential to be an important vehicle for the dissemination of information about technology to the public. The Association is planning to partner with the Iowa Newspaper Association to offer its first state convention in February 2002.

II. Goal: Engage with key constituents through synergistic partnerships to stimulate technology transfer and economic development.

a. Promote programs that stimulate economic development by assisting new or established companies through university partnerships that provide technical, financial, or other assistance.

New Point of Contact System

A "Point of Contact" system was established in March 2001 to help companies find the assistance they need within the university. The university homepage has a link for business/industry that takes the reader to the "Point of Contact" information. Since the system was implemented, the Office of the Vice Provost for Research has handled about fifteen inquiries a week. Inquiries have included requests from Iowa manufacturers for technical assistance, requests for information on special courses/workshops and requests for results of specific research projects.

Iowa Manufacturing Extension Partnership

The Iowa Manufacturing Extension Partnership's (IMEP) mission is to strengthen the manufacturing sector in Iowa. Since its inception, the IMEP outreach has made contact with 4,500 of the 6,500 manufacturers in the State of Iowa. The education and technology transferred to 700 clients resulted in the

creation of over 280 new manufacturing jobs, retention of over 400 manufacturing jobs, more than \$15,000,000 in new capital investments, \$22,000,000 in increased sales, and over \$2,500,000 in cost reduction.

The reported values exclude a significant amount of workforce development and retraining (260 E&F programs) referred to the Community Colleges by IMEP agents.

More than 425 new companies and over 325 existing clients were contacted in FY01. More than 425 projects were completed. The value of these projects in FY01 exceeded \$3.5 million.

Surveys conducted over the last four quarters show 46 companies reported increases in sales greater than \$11 million, cost reductions over \$1.0 million, additional investments of \$4.0 million and 200 jobs added or retained. The partnership has more than 300 open projects with 175 companies with targeted impact greater than \$13.5 million.

Companies Arising from ISU Technology

Companies whose formation was based in part on technologies and/or technical expertise arising at Iowa State University are below in Table 1. The nature of their business is also indicated.

Table 1
COMPANIES THAT HAVE FORMED DUE TO ISU TECHNOLOGIES
AND/OR TECHNICAL EXPERTISE

<u>Name of Company</u>	<u>Date</u>	<u>Specialization</u>
Glass House Studio	2001	Visualization and simulation techniques
Advanced Structural Imaging	2001	Aviation materials inspection
Software Concepts Inc.	2000	Software reengineering
NewLink Genetics Corp.	2000	Genomics and therapeutic products
CombiSep, Inc.	2000	Electrophoretic instrumentation technology
Nitro Cream, Inc.	2000	Ice cream processing system
Novascan, Inc.	2000	Instrumentation for atomic force microscopy
Phytodyne Incorporated	1999	Plant transformation technologies
Technology Labs, Inc.	1999	Assessing computer performance
MASIM, Inc.	1999	Process for joining ceramics
IA-TEK	1999	Process for analyzing seeds
Biotronics	1999	Ultrasound techniques for food animals
Innovative Materials Testing Technologies	1999	Advanced nondestruction evaluation techniques
Modelspace Corporation	1998	CAD System for turbomachinery
MSTRS Technologies	1998	Metered semiochemical timed-release systems
NDE Technologies, Inc.	1998	X-ray simulation code
epmt, inc.	1998	auction market simulators
Carbon Energy Technology (CETECH)	1997	Biomass gasification technology
MechDyne Corporation	1997	Haptic feedback devices
Advanced Analytical Technology, Inc.	1997	Applications of microanalytical instrumentation
Engineering Analysis, Inc.	1997	Computational fluid dynamics
Applied Academics	1997	Interactive veterinary training
Delta Tie	1997	Engineered structures
Accumen	1997	Data storage
Engineering Manufacturing, Inc.	1997	Powdered metals
Vista R & D	1997	Video hardware, software
X-L Space Systems	1997	Rocket fuel processing
Anaerobic Biosystems Corporation	1996	Anaerobic technologies
ESGA, Inc.	1996	Computer-based patient medical records system (closed in 1997)
Palisade Systems, Inc. (formerly MidAmerica Networking, Inc.)	1996	Computer network products

NewMonics, Inc.	1996	Real-time Java software & computer memory management systems
Amtak, Inc.	1995	Nondestructive evaluation instrumentation
Pefftronics	1995	Audio processing
Intellignostics, Inc.	1995	Biomedical sensors (closed in 1997)
Bioforce Laboratory	1994	Atomic force microscopy (probes)
8VA Corporation	1994	Thermal management components
Intellitech Inc.	1994	Software for nondestructive evaluation (closed)
Molecular Express Incorporated	1994	Research and testing of laboratory products
RESIFT, Inc.	1994	Ultra-high sensitivity in microsequencing small proteins and peptides (closed)
Arete Software Company	1993	Software for manufacturing processes (closed in 1995)
Pioneer Precision Coatings Inc.	1993	Hard coating surfaces (closed in 1994)
Potter Solar Services	1993	Electric Motors
Veterinary Resources, Inc.	1993	Testing new animal health products
Calfscale Company	1993	Livestock specialties
Adaptivation, Inc.	1992	Adaptive medical devices
Larock Organics	1992	Organic forms of palladium
Prototype Engineering	1992	Sensors for pilots (closed in 1995)
CETAC Technologies	1991	Analytical instruments
Full Spectrum	1991	Laser fiber optics
Ames Specialty Metals	1990	Permanent magnet materials (closed in 1993)
Edge Materials, Inc.	1990	Nondestructive evaluation (closed in 1991)
Engineering Animation, Inc.	1990	Scientific computer visualization
Metabolic Technologies, Inc.	1990	Natural biological compounds

BOEC Has Diverse Appeal

The Biotechnology Outreach Education Center, in its first full year of educating, reached more than 1000 educators, K-12 students, Extension and industry personnel, and future educators both in the lab and at off-campus locations. A large focus this past year was providing basic biotech education to more than 500 industry personnel. In addition, more than 11,000 students conducted hands-on experiments in their classrooms with supplies provided by the BOEC.

Biomass Business Gets Storage Hand

Bio-based industries hold immense promise for the chemical, fuel, and fiber industries in the coming century. An Iowa company is poised to supply those industries, collecting and processing corn stover left after the fall grain harvest. One of the company's principal challenges is long-term storage of the single annual harvest of crops and crop residues, so they can supply a reliable daily feedstock for year-round manufacturing. Dry storage has typically been used, but bears the risk of catastrophic fire. One such fire in Iowa destroyed 100,000 tons of corn stalks. Last year, Iowa State University Agricultural and Biosystems engineers and agronomists developed an alternative storage method – ensilage, the natural

acidification process that cattle farmers have long used to store moist forages for animal feed. Starting with a dry, post-grain harvest material posed some challenges, but these were overcome with a combination of mechanical pre-treatment and moisture optimization. The process worked so well that the company is building a full-scale bunker silo, and is anticipating buying 20,000 tons of corn stover, paying farmers near the Hardin, Iowa, plant for a "second harvest" above and beyond the grain.

GMO Education

Consumer and regulatory concerns over genetically-modified (GM) grains have introduced great confusion and added risk for commodity grain markets. The Iowa Grain Quality Initiative has become the leading source of web-based, meeting-based and other information concerning GM marketing situations. The background paper on StarLink has been downloaded more than 20,000 times. An information poster on Roundup Ready corn is being released to all elevators, producers and other grain interests, for reminder of proper handling in the 2001 crop. An ISU faculty member has served on the EPA StarLink science panel. Iowa agricultural interests are the best informed in the nation as to the current GM crop situation and have successfully

affected policy decisions in this area, notably on StarLink.

ISO 9000 Improves Grain Processing

Certification and traceability systems, such as the internationally recognized ISO 9000, can create marketing networks for specialized, hard to identify grains, such as those free of genetic modifications, or containing some health-promoting compounds. Iowa State University and the American Institute of Baking are working together as trainers for an Iowa cooperative elevator, a multi-station country elevator company in their program to become certified by AIB and ISO 9000 for grain quality tracking. The program is being tested at another Iowa elevator and has completely revamped operations and grain handling at a facility there.

Increasing Productivity

Over the years, a northeastern Iowa company had grown, adding more products and machinery. When the plant reached capacity, the company realized that product-flow was not optimal and wanted to re-organize the plant layout to improve productivity and reduce material handling costs. The Center for Industrial Research and Service (CIRAS), using simulation software, determined problem areas in the plant and recommended solutions for potentially reducing costs by \$170,000 and work-hours by 12,000. Currently, this company is collecting bids to make the recommended changes to the plant.

Eliminating Variations in Assembly Methods

A northwestern Iowa company contacted CIRAS for help in eliminating assembly variations in its production methods. Using experience gained from auditing ISO 9000 applicant companies, CIRAS created and tested a universal audit procedure that could be used in each of several manufacturing and assembly areas. This procedure showed that, in most cases, simple changes could be made that would provide operators with the proper information and tools to do the job correctly each time. The need for field adjustments and warranty claims has been reduced significantly since the audit procedure was implemented.

Separating Protein Offers New Business and Crop Potential

Several companies are interested in developing a multi-user facility for recovering and refining proteins extracted from animal sources and transgenic plants. The Iowa Department of Economic Development (IDED) is working with these

companies to locate the facility in Iowa. A Chemical Engineering professor is working with the Center for Crops Utilization to enhance the possibility of locating the plant in Central Iowa by offering to help create an on-campus facility that could be a resource to the company and help develop applicable protein recovery and purification process. The effort holds the potential to create a new cash crop for Iowa farmers that would be bred to provide specialized proteins suited for pharmaceutical and industrial uses.

A Better Way of Unlocking the Cell

A four-year project involving a Chemical Engineering faculty member and an Iowa grain processing company resulted in development of an alternative production process that solved two major constraints. Using principles developed at Iowa State, the company is able to improve its current amino acid recovery and purification process by significantly reducing both the water needed to support the process, and the amount of wastewater that needed treatment. The change will enable the facility to increase capacity without increasing the use of natural resources. The new process is being implemented at some of the company's locations. In addition, two Chemical Engineering faculty members presented a short course in crystallization to a company team involved in the new amino acid recovery process. The company has established a local technical center to enhance its operations and the course explained how the new process works. The faculty member will be available to advise the team on an ongoing basis.

ISU Opens Window on a Material Matter

An Iowa window manufacturer had been experiencing processing difficulties during forming operations and a Materials Science and Engineering faculty member and Ames Lab researcher performed tests to determine whether it was a materials or a process problem. Over a short time duration, a series of tests were performed to determine if the composition and mechanical properties of the material matched specifications. Content, micro-hardness, ductility, and tensile tests indicated the vendor-provided material met specifications. The company is reviewing its material specification and its application.

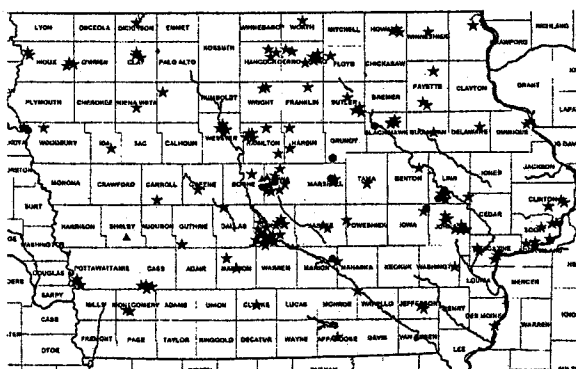
ISU Works to Keep Utilities Efficient

Iowa State's Electric Power Research Center in the Department of Electrical and Computer Engineering conducted six two- to five-day short courses aimed at

electric utility employees. 50 companies from 26 states were represented at these sessions, including 135 Iowa utility people. Course topics included protective relay operation and testing, power system operation, buying and selling electricity in a deregulated environment, and maintaining power grid integrity. Bringing these industry professionals together in a short course format provides opportunity to exchange ideas, experiences, and expertise at a time when power system pricing and reliability are critical.

IPRT Works for Iowa

IPRT's research centers and outreach programs support economic development through world-class, interdisciplinary research, working as a critical component in the university's efforts to strengthen the economic vitality of the State of Iowa. IPRT centers and programs link the university research community to Iowa manufacturers and entrepreneurs, facilitating technology transfer and providing technical assistance. The following map shows where IPRT centers and outreach programs have served Iowa companies and entrepreneurs during FY01, and Figure 11 provides historical data regarding the Institute's outreach programs that are specific to Iowa.



IPRT Works for Iowa Outreach Programs and Centers— Industrial Interactions FY01

Legend: ★ One Project ● Five Projects ▲ Ten Projects
Iowa Companies Assistance Program (ICAP)—105 projects
Iowa Demonstration Laboratory for Nondestructive Evaluation (IDL)—53 projects
Center for Advanced Technology Development (CATD)—34 research contracts
IPRT Centers—45 research projects or interactions
237 total projects and/or interactions

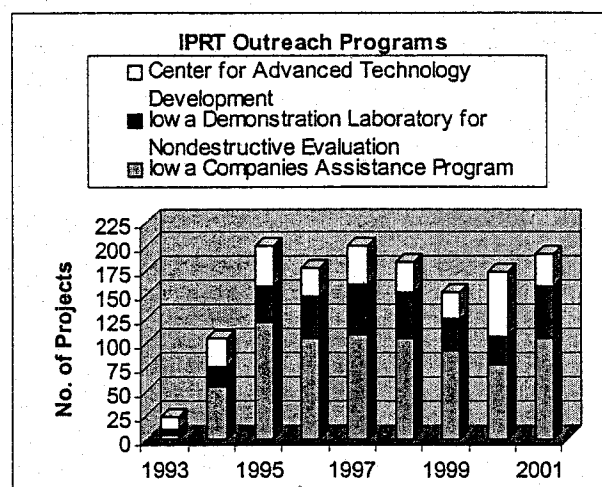


Figure 11

CATD Contract Research

Through the Iowa Industrial Incentive Program (IIP), the Center for Advanced Technology Development (CATD) links Iowa manufacturers with the resources of ISU and the UI in order to enhance the economic competitiveness of Iowa industry. In FY01 CATD implemented 34 cost-shared contracts leveraging the State's \$329,500 investment in the Iowa Industrial Incentive Program with companies' investments of \$691,600. The following briefs illustrate the work and benefits of these projects:

ISU and UI work together to assist Urbandale company An Urbandale manufacturer of computerized breath-alcohol ignition devices sought assistance from the CATD to improve the reliability of their product. The company was seeking to improve the fuel cells in their product, cells that were purchased from an outside vendor and did not meet the company's quality standards. The company had decided the best route was to produce the cells in-house but needed help developing a fuel cell "recipe" and an assembly protocol. A CATD tech transfer associate brought together state-wide research resources—ISU chemistry experts and a fuel cell expert from the UI—and developed a cost-shared Iowa Industrial Incentive Program research contract. Over a two-year period, the company invested nearly \$50K with the IIP program providing \$30K, and the research project concluded with the company having a protocol for making stable and reproducible cells—and at less than 40% of the cost of the commercial cells.

Research Park start-up credits CATD Phytodyne, Inc., a new biotechnology company located at the

ISU Research Park, sprung from one of ISU's research labs and has worked with CATD in virtually every step of its evolution from basic research to commercialization. The company's technologies simplify production of genetically modified crop plants and offer new methods for plant genome manipulation. The company believes the technology will become an important vehicle for creating new more valuable grains. CATD first provided funds as part of its technology-derisking program, helping the company prove its basic concepts. Then, CATD helped the principals prepare a successful SBIR grant, funded by NIH at \$100K. CATD leveraged the company SBIR funds with cost sharing Iowa Industrial Incentive Program funds to continue its research progress at ISU. These efforts helped the company receive mid-Iowa venture capital funds. The company states their experience with CATD has been very effective in facilitating the transfer of ISU technology into the marketplace.

Chemical engineering students spin-off ISU technology Two chemical engineering students approached the CATD for input on a commercialization strategy for their novel ice cream freezing technology and for direction in refining a proprietary concept for an ice cream machine that would rapidly and reliably produce a product that would meet USDA standards. The key was in their freezing technology that uses liquid nitrogen to instantly freeze the mixture to produce a smoother textured product and also works faster than any other technology. Using the expertise of CIRAS and the Ames Laboratory, the company entered into an Iowa IIP research contract and the company built a first-generation prototype. This project laid the groundwork for second-generation prototyping and funding through IDIED's Entrepreneurial Venture Assistance program as well as private investors. Customer feedback on the ice cream product has come from the displays at Iowa and Oklahoma state fairs and the principals have embarked on a business

strategy seeking to capitalize on the production of the new machine for sales and possible franchise distribution.

Studying the strength of lead-free solder A Ft. Dodge maker of copper-brass radiators and a Princeton producer of lead-free solder wanted to show their customers that using lead-free solder results in safer workplaces and a cleaner environment, with the added benefit of stronger joints. CATD brought all the resources together and, through the Iowa IIP, a contract was arranged and the research was undertaken by Ames Laboratory. Test results showed that all of the selected lead-free alloys had shear strengths greater than alloys containing lead and as a result the companies continue to pursue this market.

CATD gives Iowa City firm an edge Ten years ago an Iowa City company went to work addressing a significant market demand for more effective 3D image processing. The product they developed, in cooperation with the UI's Image Analysis Facility, has gained widespread market acceptance for its ease of use and low cost. The company's 3D programs are enabling technologies with numerous potential applications that serve researchers in scientific, industrial, medical, geoscience, surveillance, and environmental laboratories. A year ago the company had the opportunity to offer a significant upgrade by adding some features that customers were requesting the real-time rendering of images. To proceed with this product improvement, the company developed a relationship with CATD in the form of an Iowa IIP contract). The company principal believes that their access to CATD services shortened the development time by at least a year and that university development programs like CATD give companies like theirs an edge to stay ahead of the growth curve. The project resulted in a product that is more powerful and expands their market base.

Table 2
Summary Contract Research—Center for Advanced Technology Development (CATD)

Fiscal Year	Number of Projects ¹	Iowa Industrial Incentive Program ²	Industry Investment	University-Other Funds	IMEP ³	Contract Totals
2001	34	329.5	691.6	604.0	N/A	1,625.1
2000	36	426.9	887.8	522.3	N/A	1,837.0
1999	29	350.2	603.7	382.2	N/A	1,336.1
1998	35	400.1	477.1	443.1	N/A	1,320.3
1997	37	331.0	608.5	476.3	70.0	1,485.8
1996	27	316.1	373.0	469.7	130.2	1,289.0
1995	31	284.5	428.5	367.5	214.1	1,294.6
1994	16	280.3	294.2	360.5	268.7	1,203.7
1993	10	282.5	500.6	136.8	0	919.9
1993-2001	255	3,001.1	4,865.0	3,762.0	683.0	12,311.5

Dollars in thousands

¹At any point in time, CATD staff will be developing, implementing, or managing 25-30 projects. CATD's technology transfer associates work with Iowa industry to define research needs and match those needs with university resources. The reported number reflects the number of discussions that end in contract research agreements with Iowa firms.

²The figure in this column reflects the allowance of carryover funds from one fiscal year to the next.

³Since 1996, IMEP funding to CATD is used for project development/management and is not reflected in the contract documents.

CATD Efforts Impact Iowa's Participation in SBIR/STTR

Since 1995 the Center for Advanced Technology Development has continued its statewide leadership in Iowa's Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs, which are competitive, three-phase federal funding sources providing qualified small businesses funding opportunities for research and development projects.

In March, CATD hosted its 6th SBIR/STTR Informational Workshop with 50 attendees at the Iowa City site and 25 others at various ICN locations. The participants learned about developing successful proposals and heard specific recommendations from an NIH program manager.

In 2000, CATD assisted 15 companies with proposals and 8 of these received SBIR Phase I awards totaling more than \$680K, up from 5 awards totaling about \$460K in 1999, and one company received a Phase II award of \$750K. See Figure 12 for total SBIR/STTR awards given over the last seven years.

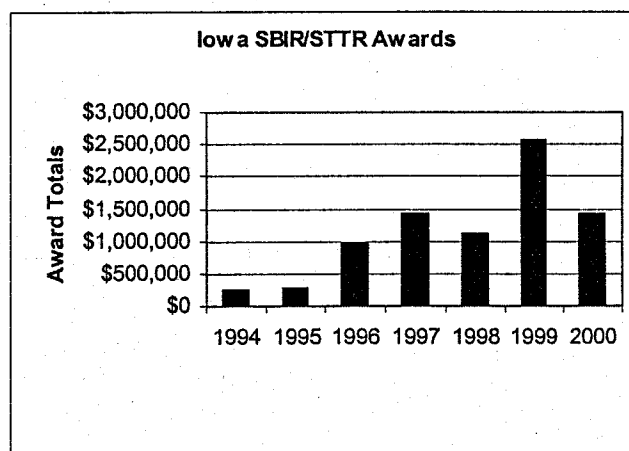


Figure 12

Comments:

- 1) CATD began SBIR/STTR outreach efforts in 1995
- 2) The decline between 1999 and 2000 is because while more companies received awards in 2000, these awards were from USDA which typically funds projects for lower dollar amounts. In 1999, 3 of the 8 awards were substantial at \$750K each
- 3) In 2001, awards from several agencies are still pending; however through August, Iowa businesses have received 5 Phase I awards at ~\$440K and 1 Phase II award for \$275K

SBIR projects funded in 2000 have a range of applications such as

- a southern Iowa company's USDA award in 1999 for work predicting the energy effects of tempering on corn drying and again in 2000 for studying the feasibility of a hot-air preheating conveyor and heat recovery systems to improve grain-dryer performance;
- an Iowa City start-up's NSF and Department of Education awards for its development of new technology that will recognize gestures such as winks, nodding of the head, etc. to control a computer or other hands-free devices.
- an ISU Research Park startup's standing as a leading research firm focusing on muscle metabolism and function by developing a promising treatment for muscle wasting that accompanies diseases such as cancer and AIDS.

Nondestructive Evaluation Technology Tapped by Local Start-up

The development of the computer-aided tap tester by the Airworthiness Assurance Center of Excellence has led to establishment of a new central Iowa company. The company negotiated a licensing agreement with the ISU Research Foundation and has recently begun marketing their products.

Turning Problems into Products

Companies seek solutions to materials problems at IPRT's Iowa Companies Assistance Program (ICAP). ICAP capitalizes on the materials science strengths of the Ames Laboratory, offering Iowa manufacturers assistance with material analysis, characterization, and testing; materials-related manufacturing problems; and synthesis of custom and specialty materials samples. The following briefs are representative of the 100 plus projects that were undertaken by ICAP in FY01:

Turning waste into profit ICAP recently had two projects with a Cresco manufacturer that each month generates 40 tons of media scrap in the production of air filters for large diesel engines. The scrap, containing phenol formaldehyde adhesive, is disposed in landfills, adding to production costs. The preliminary ICAP work has resulted in a CATD research contract drawing on the expertise of the Biocomposites Research Group, a team of faculty and researchers from the Center for Crop Utilization Research and the departments of forestry and food science. The group has investigated how the scrap media can be used in fiber plastics and oriented strand board. Initial results are promising in that the team has

found that the media scrap performs similarly to cellulose used in fiber composites.

Efforts preserve valuable client ICAP helped a central Iowa manufacturer of pickup reels for combines track down and fix a quality problem. As a result of this assistance, the company preserved a client worth about \$750,000 annually. When the company discovered that steel springs used as tines on the reels were failing, it turned to ICAP. Scientists applied their materials expertise and evaluation equipment to test the springs, providing the company with an analysis that allowed the company to remedy the problem and satisfy and retain an important customer.

Sales increases projected A western Iowa gelatin manufacturer that has annual sales of \$80M and employs more than 250 sought advice on particles that were collecting in magnetic traps used in their manufacturing process. ICAP worked with the College of Engineering's Materials Analysis Research Laboratory to determine the elemental composition of the particles. The company advised that the 40-hour no-cost project improved the company's image, led to market growth and process improvement, and has the potential to increase sales by more than \$1 million in 2002.

Product design assistance A Des Moines metal fabricator was in process of developing a device to load test shelves. The company had completed a preliminary standards and parameters search for the testing device. Then, the company engineer sought technical expertise to determine the optimal shape of the shelf supports. Through ICAP, CIRAS, and the Ames Laboratory, finite element analysis was done and now the company is preparing to launch a new product yet this year.

Problem definition ends in new product A Waterloo supplier of traffic signal equipment needed ICAP's help to determine if a new configuration of a portable traffic signal could withstand wind gusts of 80 mph. Scientists performed a stress analysis of the pole using a computer-based technique and showed that the pole could indeed withstand the wind load, ensuring the company that the \$16,000 product met its customer's specifications.

Analysis and training An Ames jewelry designer requested assistance in the consolidation and separation of scrap precious metal, including scrap

rings, chains, filings and floor sweepings. ICAP staff melted the scrap down into ingots and recovered approximately 75% of the metal. A scientist from the College of Engineering's Materials Analysis and Research Laboratory assayed the resultant metal to determine the gold and silver content. ICAP staff met with the owner to train him regarding the process.

Techniques Demonstrated, Recommendations Made

Three companies recently benefited from ICAP technical demonstrations:

- A major Ames manufacturer had trouble achieving a good metallographic polish on their leaded bronze. ICAP provided assistance showing how to best obtain the desired results on their materials.
- An Iowa City company produces a stainless steel dental appliance. The question was whether to passivate the appliance or not. ICAP was able to educate the company on the passivating process and help them determine the need. In addition, ICAP assisted in specifying the process to a passivation shop.
- ICAP recently toured a Sioux City firm that manufactures trolley and conveyor systems for meat packing plants to observe and assess handling procedures. ICAP staff made recommendations for process improvements, highlighting the benefits of proper stainless handling.

IDL Helps Manufacturers Improve Products

The Iowa Demonstration Laboratory for Nondestructive Evaluation (IDL) helps companies throughout Iowa address quality or material problems with their products. IDL draws on the strengths of the world renowned Center for Nondestructive Evaluation (CNDE) offering manufacturers nondestructive evaluation facilities and expertise in assessing integrity of materials, components, and structures; developing company-specific nondestructive evaluation techniques; and providing on-site training and assistance. The following are examples of IDL's 53 assistance projects in FY01:

Overload issue addressed—A long-time Cedar Rapids manufacturer needed to study the kinematics of a thermal-magnetic circuit breaker due to an overload condition. The arc flash that occurs during this event prevented the use of conventional high-speed photography. By integrating the company's capacitor discharge station and high-speed camera with IDL's

real-time radiography system, a capability was developed to capture images that were unaffected by the arcing.

Shrinkage defects identified—A Marshalltown manufacturer needed to rapidly inspect a number of assembled wiring components to determine if observed failure modes could be detected nondestructively so that only acceptable components could be used. Samples that exhibited a range of flaw characteristics were brought to the IDL for real-time x-ray examination. IDL identified a way to discriminate between bad and incipient bad parts and the client now has the option of having the inspection performed commercially.

Joint inspections improved—A central Iowa manufacturer was interested in learning how to characterize brass copper tubing joints to a greater degree for leak detection. IDL demonstrated how ultrasonic inspection could provide a better "look" into the braze joints, and company engineers reported that not only did they receive insight into joint characterization but also appreciated that this inspection can be extended to the shop floor or be developed as a training tool. This project benefited other manufacturers because this improved capability allowed IDL to respond more quickly to an eastern Iowa company in another project a few months later.

Partnerships Promote Quality Assurance

The community college account managers of the Iowa Manufacturing Extension Partnership market *Introduction to NDE* seminars across the state of Iowa. During the past year, IMEP account managers have arranged for IDL seminars at Ft. Dodge, Bettendorf, Sheldon, and Ottumwa at which there were 44 attendees from 28 companies. A northwest Iowa company that manufactures rotationally molded components has, as a result of the workshop, sought IDL expertise to learn better leak detection methods and other quality measures that will improve their clients' product satisfaction. The company believes that new inspections methods will positively impact their market share.

Starch Evaluation for Processed Poultry Products

A food science and human nutrition faculty member assisted a large national firm in the evaluation of several starches by working with scientists from the company to develop objectives for sensory tests on poultry products fabricated with the starches. An 18-

member panel was trained by the ISU scientist to evaluate 11 texture characteristics of the processed poultry products. The resulting information about the significant textural differences due to the type of starch will aid the company in further product development.

Iowans Offered Continuing Education Courses in Statistics

More Iowa-based businesses want their employees to continue education and pursue higher degrees. However, people find it difficult to leave their employment and come back to school. Iowa State University's Department of Statistics is offering several statistics courses through Howe Hall and the Brenton Center allowing employees to further their education in engineering and agriculture without leaving their employment. Employees of Pioneer, the National Animal Disease Center, Rockwell International, John Deere, and Maytag have participated.

Simulation Model Developed for Ames Company

An associate professor of Industrial Education and Technology completed a project for an Ames company developing a simulation model for its Central Paint Simulation System using ProModel software. This simulation model enables engineers in the company to make adequate decisions in adding more products or lines into the existing system. The simulation was designed to be able to change parameters for evaluation and analysis. It has been a very successful project; consequently, the system has added four more product lines.

Applying Information Technologies for Teacher Education

The Department of Curriculum and Instruction partners extensively with K-12 schools districts to conduct professional staff development for practicing teachers and school administrative staff thereby improving the effectiveness of the teacher and educator workforce in the state. For educators, technology consists of effective instructional, teaching, and assessment/evaluation techniques, and these are a main focus of this department's technology transfer and workforce development efforts. Examples include:

- *Science Cooperatives* - ISU's Center for Excellence in Science and Mathematics Education have worked with the University of Missouri, St. Louis and the University of Iowa on a local systemic reform project, funded by a \$5.8 million

NSF grant, that focuses on improving science education in the K-6 grade levels. Rural schools in Iowa and Missouri are participants in this project. The total number of teachers involved is 1,500 in 36 school districts across the two states. A unique feature of the project is the use of multi-state, multi-site interactive television as a means to continue professional workforce development that begins with a summer workshop program. Teachers learn about, implement and evaluate the use of inquiry based science teaching methods within their classrooms. The Science Cooperatives Project involves the use of the Iowa Communication Network (ICN) and focuses on both content and pedagogical update for elementary teachers. More information on this project can be viewed at <http://biology-afs.biology.uiowa.edu/iamo-coop>.

- *Use of Scanning Electron Microscope* - Faculty members in the Department of Curriculum and Instruction have collaborated with faculty members in Material Science and Engineering to explore the use of a Web-based Scanning Electron Microscope for standards-consistent science instruction.
- *Technology Collaboratives for Simultaneous Renewal in Teacher Education (TechCo)* - A major goal of this project is to design and implement technology experiences that will enhance all education courses and field experiences taken by a cohort of teacher education students and embrace a vision of technology as a tool to facilitate renewal. In addition, this group works collaboratively with K-12 teachers and administrators to create technology-rich field experiences and sites for ISU's teacher education students. TechCo partners include many central Iowa schools, Heartland AEA 11, Seymour Paper Institute, University of Virginia, and Apple Computer, Inc.. The cohort of ISU preservice teachers have had numerous experiences out in the classrooms working with inservice teachers; these field experiences are directly tied to teacher education courses in their program. Nearly sixty inservice teachers and twenty-six preservice teachers are currently involved in the project. Beginning next fall, another cohort of twenty-five preservice teachers will join the project.

The Center for Technology in Teaching and Learning integrates effective teaching and assessment technologies with the use of hardware digital information technologies. It develops the educator

workforce's capabilities to bring about more effective and efficient student-centered learning.

Using Mathematical Tools

A mathematician consults for Proctor and Gamble to develop mathematical tools for the analysis of gene expression profiles. These tools will be used to identify genes that control genetic networks. He also collaborates with Integrated DNA technologies (Iowa City) to develop machine learning methods to improve the design of PCR primers, which are reagents used in the basic and applied life sciences to fish out DNA sequences of interest (such as genes).

Computer Science Applications

A computer scientist collaborates with an Iowa company on the use of electric power usage data to build customer profiles to increase the efficiency of distributed deregulated power systems. He also works with other regional companies to develop artificial intelligence and distributed computing techniques for robust adaptive communication networks, to develop data integration and data mining techniques for precision agriculture, to optimize data integration and data mining, to design data mining algorithms for bioinformatics, and to develop intelligent agent technologies.

b. Heighten efforts to ensure the results of ISU research and technology are used for public benefit

Fragile Land Preservation

An estimated one million acres of Iowa farmland border streams and rivers. Much of this is fragile area at risk of collapsing. Iowa State researchers developed a system for establishing buffer strips of trees, shrubs, and native grasses to stabilize these banks. The system includes wetlands to slow the water flow and trap sediment. New work with Geographic Information Systems identifies potential sites for tile-intercepting wetlands. The buffer strips reduced rainfall runoff 92 percent and resulted in a 93 percent reduction in sediment runoff compared with an unbuffered area. Nitrogen and phosphorus loss was cut by more than 90 percent as surface water passed through the vegetation buffer.

Indianola Design and Planning Assistance

During the 2000 fall semester, undergraduate and graduate students in the community and regional planning department's Urban Design and Planning

Practice class worked with the town of Indianola, Iowa. The studio researched and analyzed the downtown area from a variety of perspectives, including historical uses and appearance, current visual appearance, and traffic and pedestrian flow, as well as current and potential amenities and activities to attract staff and students from nearby Simpson College.

The class created designs that integrate the expanded Downtown District with the existing square, which students proposed should be made an octagon in keeping with its historical shape. They proposed a system of crosswalks, banners, and lighting that would highlight the borders of the Downtown District; changes in parking and traffic flow to improve access to the downtown and its businesses and make the area more pedestrian-friendly; and front façade and rear elevation improvements to buildings in the downtown to enhance their visual appeal. The class also provided cost analysis and proposals for financing and phasing of the various design projects.

Promoting Tech Transfer Resources

The executive director of ISURF and the Office of Intellectual Property and Technology Transfer, the director of the NASA Food Technology and Commercial Space Center, and the biotechnology industrial liaison attended the national biotechnology association's BIO conference in San Diego and exhibited a display of research and industrial resources available at Iowa State. ISU was also a sponsor for the Iowa Department of Economic Development's efforts to promote the state's biotechnology development opportunities, with a theme based on the board game "Life."

Sibley Visual Identity Development

Students in the spring semester 2001 Graphic Design Practicum created a visual identity system for the town of Sibley, Iowa, that includes logotypes, letterhead, business cards, business envelopes, billboards, a town brochure, and banners. These components were designed to help Sibley define itself to visitors, showcase its strengths, and promote community spirit and involvement.

Hens Benefit from Cooling Work

Iowa leads the nation in egg production, with approximately 31 million laying hens. The typical housing system is not designed for the occasional but devastating heat waves. The egg industry needs alternative cooling system(s) that can be retrofitted or installed into the commercial layer barns. Working

with the Iowa egg industry, an Iowa State faculty member investigated and demonstrated a cost-effective heat-stress relief method of direct surface evaporative cooling. The new cooling technique has the potential to save the Iowa egg industry millions of dollars.

Iowa Hoops It Up

Environmental concerns related to manure and odor have caused many small- and medium-sized family-based producers to rethink how they raise pork. Iowa State researchers have studied the practice of raising hogs in hoop structures, low-cost, tent-like buildings that were introduced in Canada. A comparison of the hoop systems with confinement operations found no major differences in cost of production, feed intake and growth rate, pig mortality, and animal health. The solid form of manure from the hoop systems avoids concerns and risks related to liquid-manure handling from confinement operations and is more easily composted. Odor is reduced with the hoop systems and the houses represent a more humane production method. The number of hoop structures in Iowa went from 0 to 1,500 during the last ten years.

Weatherview

Motorists can access current weather conditions for roadways and airports in Iowa using the Weatherview Web site developed by Center for Transportation Research and Education (CTRE) for the Iowa DOT. The site (www.IowaWeatherview.com) provides public access to near real-time information on temperature, wind speed, and precipitation. In partnership with the Iowa DOT, CTRE is enhancing the site with additional information including regional forecasts and radar imagery.

Transportation Assistance

The Iowa Local Technical Assistance Program (LTAP) director provides transportation-related advice to Iowa communities as part of ISU's Extension to Communities program. Examples of activities in the last year include:

- Hubbard – Last year a devastating explosion crippled the downtown business area in Hubbard. The LTAP director provided transportation guidance at a meeting to see what options might be available and at a workshop with Hubbard high school students who will develop rebuilding options for the city to consider. A follow up meeting will be scheduled once the students have had a chance to develop some concepts and computer-aided drafting (CAD) drawings.

- Mason City – Traffic corridor analysis on Iowa 122. The LTAP Director reviewed speed and accident studies, land use and proposed development scenarios, evaluated traffic signal location and coordination, and developed a preliminary access control plan.
- Keokuk County – Provided information on the decision makers involved in paving a county road serving a county park.
- Mediapolis – Presented a gateway intersection design concept that complimented other landscape planning proposals. A roundabout intersection design was presented that provides a gateway statement into the city and is in harmony with the proposed main street landscape preliminary concepts.

VRAC: ISU's Cutting-Edge Showcase

Even the visionary planners of IPRT's Virtual Reality Applications Center (VRAC) are awed by the impact of the C6 – the two-story, state-of-the-art VR interface – on ISU's land-grant mission. The initial \$5 million in ongoing funded research grew to \$10 million in FY01. At fiscal year end, VRAC had more than 30 ongoing funded projects with about 25 separate principal investigators involving 90 students. Selected projects with Iowa industry are highlighted:

Virtually moving - A southeast Iowa company that manufactures and markets a digital satellite system for use on recreational vehicles wanted to move their dish receiving system from stationary use to allow reception of signals from both sea and land vehicles under normal operating conditions. The company turned to VRAC for research and development assistance and following a two-year project that involved modeling of control systems with a VRAC scientist from Mechanical Engineering, the company is well on the way to their goal. The company invested \$140K in the research project that began in 1999 with analyzing and developing the antenna system for dynamic response and model sensor and actuator characteristics, and now, following recent prototype testing the company, is ready to market the product to original equipment manufacturers and through direct kit sales. In addition, a recent ISU engineering graduate employed by the company worked closely on the project.

Move it with VRAC research – A northwest Iowa company invested more than \$200K in contract research with VRAC to automate and improve the capabilities of their heavy lift assistance equipment. A project team led by a Mechanical Engineering

researcher, developed a natural, hand-held interface for the company's lift assistance product and did a prototype testing in a client's plant. This was a unique approach to overcoming the inherent physics of friction and mass momentum that couldn't otherwise be eliminated by just buying higher quality components and close tolerance machining – this technology revolutionizes the concept of work in material handling. The results of this project demonstrate how state universities impact Iowa's economy: the product now is being marketed at trade shows and the company estimates that, even in a economic downturn, sales will exceed their R&D investment. One of the ISU graduate students working on the project accepted employment with the Iowa company, and the company is now working with ISURF to license the technology that resulted from this industry-university collaboration.

Building virtual products from agriculture to energy — A major farm equipment manufacturer has come to rely on VRAC for product development, looking to virtual reality applications that foster innovation and create better solutions in less time. Research—concluded and ongoing—includes vehicle simulation, studies of human factors and ergonomics, engineering data analysis, virtual assembly methods planning, and collaborative engineering. VRAC is also collaborating with a major seed company in visualizing gene expression data; is working in conjunction with Ames Laboratory and a mid-Iowa power company to design furnaces for power plants to help solve fluid dynamics problems and examine design alternatives in real time.

Military applications in immersive environments — In a partnership of university, state, and federal entities, the VRAC has joined with the Iowa National Guard and the Iowa Technology Center to assist the Department of Defense in solving information technology challenges. VRAC's expertise at the forefront of computer-generated immersion made it an ideal partner for developing the next generation of training, command and control, and surveillance and battle management interfaces with the armed forces.

Service Projects

One hundred undergraduates per year impact Iowa communities positively and concretely through service learning projects in one agriculture course. The junior-level leadership-in-agriculture course, offered by the Department of Agricultural Education and Studies in two sections, provides structured opportunities for

students to break out of the classroom and into the community to help organizations and businesses benefit society. Instructors depend on service-learning projects to teach students how cooperation, leadership, conflict management, and goal-setting work in the real world.

Reducing Deer-Vehicle Accidents

An ISU report on current technologies to reduce deer-vehicle accidents caused several communities to alter initiatives to reduce such accidents, including the City of Ames. It has been used by the Illinois Department of Transportation in planning wildlife underpasses and other measures directed at reducing deer-vehicle accidents.

Swine Ultrasound Training Conference

Iowa State University offers the only swine ultrasound training and certification conference in the nation. Producers and other pork industry professionals from nine states and one Canadian province attended last year's program, organized by the Iowa Pork Industry Center at ISU. During summer 2001, the team of two grad students and one undergrad scanned more than 1,800 hogs (and 450 state fair derby hogs, 120 lambs and 28 steers) in 21 counties.

Ag Professionals Help Iowa Dairy

One-on-one extension consulting often involves teambuilding and education with other ag professionals. One example is a 330-cow Iowa dairy that was in danger of losing its milk market. Based on information the producer was asked to record, extension staff, with the participation of students, identified procedures to solve the dairy's problems. This herd has been used in case-study teaching modules at the College of Veterinary Medicine, the Animal Science Department and extension meetings and visits.

Horticulturists Develop Professional Certification Programs

Iowa State horticulturists cooperated with the Iowa Nursery & Landscape Association to develop the Iowa Certified Nursery Professional Program (ICNP). Two new study manuals (one for garden center employees and another for landscape contractors and installers) were produced, and certification testing is conducted twice annually.

Wind Resource Study Helps Spur Rural Development

Iowa is the 10th windiest state and, because of its rural character, is a prime location for large-scale wind farm development. To determine the optimum location for a wind turbine or wind farm, developers typically implement extensive and expensive wind speed monitoring programs. For years developers knew the broad regions of Iowa that have the highest average wind speeds; however, they lacked tools to easily identify local sites that could serve as ideal turbine locations. In response to that need, the Iowa Energy Center began a six-year program to determine the wind speeds at any given location in Iowa. The study, which combined actual measurements with a commercial GIS-based computational model, was completed in 2001. To help individuals and organizations determine the feasibility of wind energy for their homes, farms, and businesses, a wind turbine output calculator was developed and is accessible via the Energy Center's Web site <http://www.energy.iastate.edu/wind/calc.cfm>.

To date, these wind farms have generated over \$1 million in revenue for farmers who have wind turbines located on their properties. When properly implemented, those projects will save hundreds of thousands of dollars in energy costs over the life of the wind turbines. The assessment remains the most comprehensive statewide study ever performed in the U.S. and is freely accessible to the public.

Performance Measurements

Two political scientists consult for nine Iowa cities to assist citizens and officials in implementing performance measurements of selected public services. This consulting is part of a project ("citizen-initiated performance assessment") funded by the Alfred P. Sloan Foundation.

Reducing Contamination

A biologist consults for the EPA Wetlands Nutrient Criteria Workgroup, which is responsible for providing technical guidance with regard to nutrient criteria for wetlands. He also consults for Iowa CREP (Conservation Reserve Enhancement Program), which is a local, state, federal and private partnership to provide incentives to landowners to voluntarily establish wetlands for water quality improvement in the tile-drained regions of Iowa. The goal of the program is to reduce the contamination of streams, rivers and groundwater by nitrates and other agrochemicals. This ecological research laid the groundwork for the establishment of Iowa CREP,

which will be an \$89 million program over the next 10 years.

Iowa Journalism

Two journalists taught the basics of journalism to 12 Iowa community newspaper staff members who had never had any formal journalism training. Topics included developing story ideas, newsroom management, visual reporting, design, and photojournalism. The institute was sponsored partly by the Iowa Newspaper Foundation.

TV Math

A mathematician serves on the manuscript review board for a TV series called "Cyber Chase,, which presents mathematics for grade school students.

Educational Outreach

Some highly visible, educational outreach activities in the state include the Masters of Public Administration (MPA) degree program in Des Moines, which is supported by several members of the Political Science Department, the Bioethics Program, which is housed in the Department of Philosophy and Religious Studies, and the Hispanic cultures program coordinated by the Department of Foreign Languages and Literatures. These programs have been very active during the past year in the development of human resources for technology transfer.

c. Enhance the growth of the Research Park.

In 1984, the Iowa State Innovation System and the Iowa State University Research Park were simply ideas, brought about by a directive of the governor to diversify the economic development within the state. Governor Branstad asked the universities to react more positively to what was then the High Technology Council's recommendation regarding the establishment of university incubator and research park programs. The Iowa State Innovation System (ISIS) began in 1986 in Old Botany on the Iowa State University campus. The ISU Research Park Corporation (ISURPC) began in 1987 as a not-for-profit 501(c)(3) corporation, operating under a board of directors appointed by the Office of the President of Iowa State University and the ISU Foundation. The first multi-tenant building was completed and occupied in 1988. By 1990, 35 companies and university centers had already been associated with ISIS and the Research Park, with 18 companies and centers still located in or

affiliated with the Park. At that time, those 18 companies employed 234 employees within the Park grounds. The ISU Research Park Corporation had just completed the first phase of its second multi-tenant facility and American Meat Protein Corporation (now known as Proliant, Inc.) had already completed the first phase of its building. 17 acres of Phase I land development was either sold or occupied by multi-tenant facilities.

In 1995, 74 companies and centers had been located in the Research Park. Thirty-one of those companies were still associated with the Research Park as tenants or affiliates and employed about 584 employees. ISURPC had completed the second phase of Multi-tenant Building #2, Proliant completed the second phase of its building, and Etrema Products had just moved into their new building. 23 acres of Phase I land was sold or occupied and infrastructure development began with the Phase II land development. The Research Park had one company that was associated with a Fortune 500 corporation-Dupont.

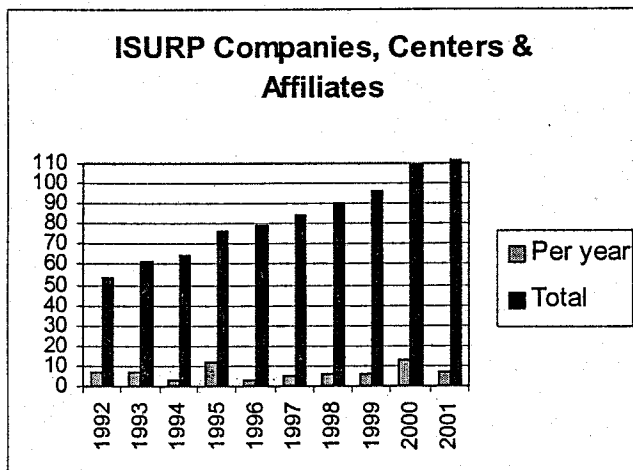


Figure 13

By the end of FY01, 116 companies and centers had either been located in or affiliated with the ISIS program and the ISU Research Park (see Figure 13). 50 companies were still associated with the Park and the tenant companies employed 797 people (see Figure 14). Fourteen former Research Park tenants and affiliates were still doing business in Iowa, taking the total Research Park-impacted employment to 1,401 people within the state of Iowa. The total number of employees worldwide exceeds 1,600. The ISU Research Park Corporation held 122,000 square feet of multi-tenant space and single occupancy tenants total 147,700 square feet, bringing the total square footage

within the Research Park to over 260,000 square feet (see Figure 15).

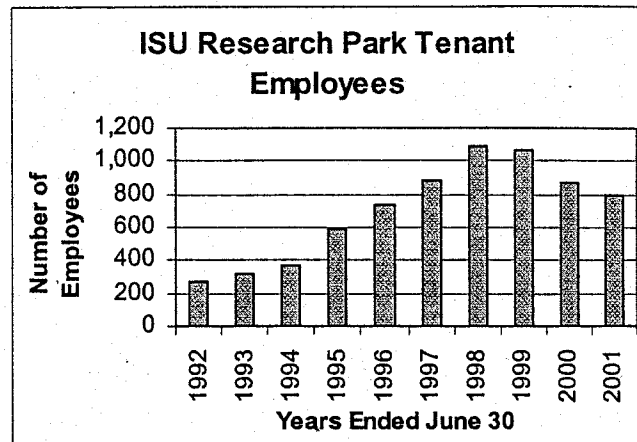


Figure 14

All 41 acres of the Phase I land development are sold and occupied, with 6 acres in Phase II land development occupied. An additional 9 acres are expected to break ground on two new projects during the fall of 2001. The Research Park now has three Fortune 500 companies represented and one private multi-national corporate research facility.

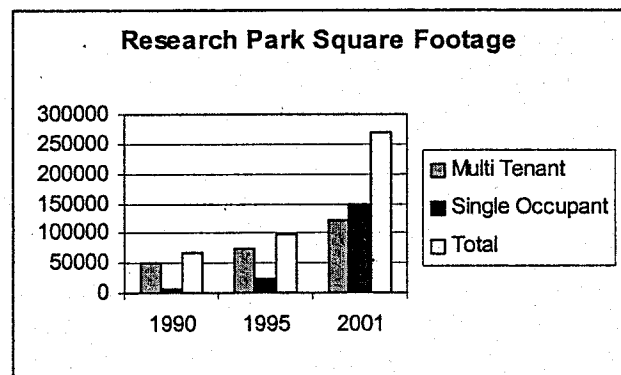


Figure 15

The concentration of industries represented in the Research Park has slowly evolved into a mix of information technology services, biotechnology research facilities, and a varied combination of technologies ranging from non-destructive evaluation to ultrasound evaluations. Currently, over 50% of the people employed by current and former Research Park companies are employed with biotechnology firms, 21% are employed by information technology companies, and the other technology-based companies employ the remaining 28%. The number of biotechnology companies and their corresponding employees has steadily increased over the past few years. While the number of information technology

companies has increased, their total employment numbers include some downhill trends.

Overall, the success rate of Research Park companies is strong. Of the 116 companies that have been in the Park, 50 companies are still located in the Park, 29 relocated or expanded elsewhere, 12 have been absorbed, acquired, or reformed into different organizational structures, and 25 have failed.

The State of Iowa continues to benefit from the creation of dozens of diversified companies and over 1400 high quality jobs. The presence of this cluster of high-tech companies enhances Iowa's opportunities for attracting established technology firms and entrepreneurs and for "keeping Iowans in Iowa."

At the Iowa State University Research Park, faculty and students have an opportunity to consult and work with these enterprises and to explore the path from academia to the marketplace. Entrepreneurs have access to the latest knowledge and research at ISU. The Park will continue to realize its full economic potential for the State of Iowa with the further development of new technologies from Iowa State University.

CATD Partners Across the Campus and the State

The Iowa Department of Economic Development (IDED) has just funded a three-year \$500,000 ISU initiative called the Technology Commercialization Acceleration Program (TCAP) that seeks to aggressively commercialize Iowa university research. IDED supports this project as it is in concert with the state's new economic development initiative that seeks university-industry collaborations to create high-tech, high-wage companies across the state. The partnership, led by the ISU Research Park in partnership with CATD, the ISU Research Foundation, and the Pappajohn Center for Entrepreneurship, plans to demonstrate the effectiveness of industry-university technology commercialization using funds for market research, technical assessment, product development expenses, and intellectual property filings. The group projects that at the conclusion of the project, 15 new Iowa companies and 40 new high-tech jobs will be in place.

d. Continue to develop and implement programs that interface ISU graduate and undergraduate students with Iowa companies and communities.

Iowa Companies and ISU Students Link for Jobs and Internships

The second annual Biotechnology Career Day was another success in promoting both Iowa biotechnology companies and ISU students to each other. Each year, more than 350 students of all levels and more than 30 majors visit with 12-15 companies looking to fill job and internship openings. The event has been extremely well received by attending companies and there was a more than 90% return rate of companies for the second event. The event is co-sponsored with the Iowa Biotechnology Association.

Onawa Retail Design Assistance

During fall semester 2000, faculty-supervised teams of senior interior design and graphic design students implemented a joint project with 11 retail businesses in Onawa, Iowa. *Preserving the Past, Focusing on the Future: Onawa, Iowa* focused on preserving or restoring the historic character of the building façades, tying together the interior and exterior appearances of each store, and updating the interiors aesthetically and functionally while fulfilling accessibility requirements. A final report containing full-color design exemplars was published in March 2001.

Harlan Historical Preservation and Downtown Revitalization

Senior graphic design students spent the 2001 spring semester working with the Harlan Chamber of Commerce to produce recommendations for visually revitalizing the historic downtown or "town square" area. The students identified appropriate historical preservation guidelines and techniques, and developed a broad range of recommendations such as color and signage selection to help enhance and unify the appearance and functionality of the Harlan town square. The chamber of commerce intends to use this report and its recommendations to lobby individual businesses to make proposed improvements, the goal of one day transforming the downtown into a visually cohesive historic district it can market as a destination for visitors.

Farmers Market Design Project

Working through ISU Landscape Architecture Extension, faculty and students in architecture, landscape architecture, and graphic design conducted written surveys, interviews, and group workshops with a variety of sources and stakeholders—particularly, producers and consumers—created the Farmers Market Design project. This project created prototypes of product stands. An overview of the project is available on the Web at www.laext.iastate.edu/farmstand.

North Central Collaboration for Education in NDE

For the past four years, the Center for Nondestructive Evaluation (CNDE) has led an NSF-funded program titled the North Central Collaboration for Education in Nondestructive Evaluation and Testing (NDE). This effort brought together NDE instructors at four Midwest community colleges with staff at CNDE to work at enhancing NDE education and improve articulation between the participating institutions. Northeast Iowa Community College in Peosta is part of this collaboration with community colleges in Kansas, Minnesota, and Nebraska. The group has worked to introduce advanced teaching methods and develop new materials that allow students to learn concepts better and in less time. Following the initial NSF funding, an NSF Advanced Technological Education grant was recently awarded to the group. The new award will expand the collaboration to develop an Internet site that will serve as a national focal point for NDE education.

Establishment of a Bioresource Engineering Graduate Program

IPRT's Center for Sustainable Environmental Technologies (CSET) has received notice of a \$375,000 award in funding from the U.S. Department of Energy to establish and administer a graduate major program in Bioresource Engineering, an area not currently served by traditional academic disciplines. This interdisciplinary program will offer students advanced study in the use of plant and crop-based resources with a goal of preparing them for careers in the biobased-products industry. The program will include three fundamental elements. The academic program will feature a new graduate major at ISU that combines targeted coursework in traditional academic areas such as chemistry, microbiology, agronomy, and engineering with specialized courses in bioresource engineering. The research program emphasizes new pathways for the utilization of lignocellulose to value-added products. The program element of industrial

interactions is designed to assure that the academic and research programs are targeted at topics of relevance to the bioresource industry.

Multi-Generational Farming

A relatively large number of students in the College of Agriculture have a dream of returning to their home farm as a career choice. For seven years Extension and the Department of Agricultural Education and Studies have helped Iowa farm families determine, then manage the possibilities of multi-generational farming. Over 75 families have participated in this "one-of-a-kind" program.

Business Development

In the last year, the Pappajohn Center for Entrepreneurship has given close to 4,500 counseling hours to technology companies, many of which are located at the ISU Research Park. The Center is currently working with around 40 technology companies or potential companies.

Entrepreneurial Studies

The University's Entrepreneurial Studies program attracts students from all over campus. Over 100 students participate in the ISU Entrepreneur Club. Over 100 courses with an entrepreneurship focus are currently offered throughout ISU.

The Pappajohn Center's outreach programs serve students, faculty, and the business community. In 2001, over 2,700 students will participate in Center programs and outreach events (an increase over the estimated 90 students who participated in programs in 1997). The Youth Marketplace program informed 600 elementary/middle school students in Iowa about how to start their own business.

Entrepreneurship Program Provides Hands-On Learning for Students

The Pappajohn Center's three student business laboratories (Software Development, Business Analysis, and Technology Business Assistance Labs) and its entrepreneurship program employ more than 50 students per semester. These experience-based learning opportunities attract students from all disciplines at ISU, including a large number from the life sciences and information solutions majors. Work performed by the students supports real-life companies and potential companies in Iowa. The Center helps companies recruit students and employees through its communications network of over 1,500 people.

Network of Expertise

The Pappajohn Center for Entrepreneurship proactively works with partnering colleges, organizations, and individuals to create a network of expertise offering valuable service to all Iowa entrepreneurs and potential companies. The Center has hosted two gatherings of ISU research faculty to explore opportunities in business creation. Over 75 ISU faculty have attended the informational programs

e. Emphasize efforts to partner and build relationships with constituents and stakeholders by participating on committees, commissions, etc., that address the needs of communities and businesses.

Public Understanding and Acceptance of Biotechnology

The biotechnology industrial liaison made more than 20 presentations on Biotechnology to groups of teachers, community leaders, and industry personnel. The topic of these presentations included basic information about the science of biotechnology as well as discussions concerning the acceptance of biotechnology products. As part of this, the biotechnology industrial liaison worked with the Iowa Biotechnology Association (IBA) to develop a workshop on the basics of biotechnology for a non-scientist audience.

ISU Works with IDED

Recent ISU and IDED collaborations have included:

- The Coordinating Council on Technology Transfer (CCOTT) met with the Director of IDED and six other IDED staff members on December 14, 2000, to discuss ways in which the two groups can work together more effectively in providing assistance to businesses and industries, as well as communities, across the State. At the end of this meeting, it was decided that case studies would be developed for companies that were assisted by both ISU and IDED.
- A working group made up of selected individuals representing both CCOTT and IDED met in Des Moines on February 27, 2001, to review the case studies mentioned above in an attempt to better understand how ISU and IDED can deliver technology-based economic development programs and services to businesses and communities. Another goal was to develop a

collaborative plan between ISU and IDED to cooperatively market and deliver services in a manner that is customer focused. As a result of this meeting, three committees were formed to concentrate on three specific goals: 1) increase the number of start-up companies in Iowa communities by utilizing ISU research and technology transfer; 2) increase new businesses that are attracted to Iowa by utilizing ISU contacts; and 3) increase the number of existing Iowa industries that expand or modernize by accessing ISU research and development. The work of these three committees is currently underway.

- On April 17, 2001, ISU, IDED and the University of Northern Iowa participated in a joint "road-show" presentation at Cedar Falls to a conference sponsored by the Cedar Valley Manufacturers Association and the Iowa Northland Regional Council of Governments. Presentations were given by Jim Bloedel, Stan Johnson and Tom Barton, all from ISU; C. J. Niles, Director of IDED and Randy Pilkington from UNI that focused on what each organization offers in regard to business/industry assistance. In addition, testimonials from local Cedar Falls businesses were given in regard to their interactions with ISU and a number of ISU displays were exhibited.
- On April 18, 2001, Jim Bloedel, vice provost for research, gave a presentation to the IDED Board of Directors and staff that was similar to the "road show" presentation described above. Representatives from UNI and the University of Iowa gave similar presentations. This joint Regents presentation was done to both better inform the IDED Board of activities in each university and to rehearse this joint presentation that was given on May 24 at the annual conference of the Professional Developers of Iowa in Council Bluffs.
- IPRT's Director recently reported to a working ISU/IDED committee that he arranged a tour for two R&D executives from a U.S. multi-national company involved in materials manufacturing. The group toured several laboratories including the Microelectronics Research Center, met with university materials experts in metallurgy and ceramics, and toured a Boone start-up company.
- The director of the Center for Nondestructive Evaluation is working with the ISU/IDED working committee to target manufacturers of non-destructive evaluation equipment.
- The director and associate director of the CATD participated on the Advanced Manufacturing

Committee of the Iowa Economic Development Technology Initiative.

- IPRT and the College of Business sought the advice, collaboration, and partnership of the leaders in the Iowa Economic Development Technology Initiative in two proposals, NSF's Partnerships for Innovation and USDA's Fund for Rural America. Awards are to be announced this fall.

ISU Professors on National Committees

A faculty member from the Economics Department was appointed as a member of the National Research Council's Committee on Biological Threats to Agricultural Plants and Animals, a new study for the Board on Agriculture and Natural Resources of the National Academy of Science. The committee will evaluate U.S. preparedness for biological threats to agricultural plants and animals, and focuses on the preparedness, deterrence and prevention of the U.S. system and the use of science in the agricultural system.

An agricultural economics professor serves on the U.S. Environmental Protection Agency Science Advisory Board, Environmental Economics Advisory Committee. She is also a consultant for a firm contracting with the National Park Service to value National Parks.

f. Build partnerships with state and local agencies in an effort to enhance a broad range of economic development efforts.

Transportation Studies in the Des Moines EC

The Community Outreach Partnership Center (COPC) project is a joint endeavor of the Department of Community and Regional Planning, Iowa State University Extension, the City of Des Moines, and the Des Moines Enterprise Community (EC). The project is funded through a grant from the U.S. Department of Housing and Urban Development and matching contributions by Iowa State University. As a part of the COPC project, eight civil engineering graduate student members of the fall 2000 Transportation Systems Development and Management studio identified existing and potential transportation problems related to increased economic development in the Enterprise Community.

Loess Hills Study

A team of Community and Regional Planning faculty and students conducted a study and prepared a report for the Loess Hills Alliance on the patterns and costs of suburbanization in the seven Loess Hills counties in western Iowa.

One of the group's key tasks was to develop a database identifying locations and key characteristics of all new residential development in the seven counties, and enter that into a geographic information system (GIS). With this database, the counties, the Loess Hills Alliance, and/or future investigators may more easily address questions that the limitations on the College of Design study left unaddressed.

HIRTA Online Database

The College of Design has developed a Web-based solution for reporting vehicle and ridership data to the Heart of Iowa Regional Transit Agency (HIRTA). The three main issues involved were 1) how to distribute ridership across different contracts, 2) how to make reporting easier and more efficient, and 3) how to make this new system fit within existing structures.

The College of Design and the Center for Transportation Research and Education developed a model for distributing riders across contracts that allows for accurate accounting of total miles and total hours logged by a particular vehicle while maintaining flexibility in billing. Using existing browsers and Internet connections, the design team also created a World Wide Web interface to the database that anyone with the right connection, user name, and password can access.

IMEP Encourages Collaboration

IMEP encouraged and funded a collaboration related to Y2K connecting faculty and students with business and industry in Iowa. LAS provided hotline support and curriculum testing and the College of Education developed curriculum used worldwide and participated in the train the trainer delivery. Indirectly, IMEP, through its restructuring, also has substantially increased the capacity of CIRAS to involve students and faculty in projects directly connected to business and industry in Iowa. This increase was achieved by obtaining additional funds required to make the needed contacts in the business community.

Improving International Animal Health

The Institute for International Cooperation in Animal Biologics (IICAB) continued in its role as an Office

International des Epizootics (OIE) Collaborating Centre for the Diagnosis of Animal Diseases and Vaccine Evaluation in the Americas. The OIE Collaborating Centre includes Iowa State University and the USDA Animal and Plant Health Inspection Service in Ames. The Ames Centre is the only OIE Collaborating Center affiliated with a university in this hemisphere. OIE Collaborating Centres provide the 158 OIE member countries with scientific and technical assistance and expert advice on topics related to animal disease surveillance and control. Collaborating Centres also develop training courses and workshops and organize scientific meetings on topics related to the OIE mission. As a part of its mission, the IICAB organized the 6th Annual Veterinary Biologics Training Program. A total of 30 international participants from 17 countries attended the program along with 47 U.S. participants from government, industry and academia.

The IICAB also organized the Biologics for Cancer Diagnosis, Prevention and Immunotherapy for 100 representatives of academia, government and industry in April 2001.

Promoting Biotech Opportunities

The Ames Chamber, Greater Des Moines Partnership and the Biotechnology Industrial Liaison collaborated to produce a brochure about the biotechnology resources available to companies interested in locating in the Ames/Des Moines area.

Motor Vehicle Crash Location Tool

Law enforcement agencies in Iowa are locating motor vehicle crashes and other incidents using software developed by CTRE. The GIS (geographic information systems) Incident Location Tool software provides enforcement personnel with a digital map including all roadways in Iowa. Officers simply click on the map where the incident occurred and data are captured for transmission to Iowa DOT. Currently, 160 agencies in Iowa have adopted this technology. There is also growing interest from other states including New York, South Dakota, Georgia, and Tennessee. The Incident Location Tool was developed as a module for the Iowa DOT Traffic and Criminal Software (TraCS). Development is currently focused on generalizing the software for use with digital maps from other states.

Local Technical Assistance Program (LTAP)

The Iowa Local Technical Assistance Program (LTAP) began in 1983. The goal of the Iowa LTAP is to share new research and technical information with local

transportation agencies and help them in their daily transportation operations. Iowa's LTAP is managed by Iowa State University through the Center for Transportation Research and Education (CTRE) under an annual contract administered by the Iowa Department of Transportation (Iowa DOT). Iowa LTAP manages six service areas including maintenance of appropriate mailing lists, distribution of a quarterly newsletter and other technology transfer publications, a library of technical reference materials and information, acting as an information and referral service, workshops and training sessions, and the evaluation of Iowa LTAP. In conjunction with the Iowa DOT, the Iowa LTAP has added a seventh task: the Safety Circuit Rider program.

In the first six months of 2001, LTAP trainers conducted 13 training sessions, attended by 521 individuals, represent 5528 contact training hours.

Safety Circuit Rider

The Iowa LTAP added the highway safety circuit rider program to improve outreach to safety-related workers in all communities and counties throughout Iowa. The objective of the circuit rider program is to reach audiences that are a challenge to address through conventional training channels. A CTRE staff member visits counties, cities, and contractors to present workshops and provide safety materials at local facilities such as garage break rooms, county court houses, libraries, and other locally-accessible places.

Iowa Traffic Data Service

The Iowa Traffic Safety Data Service (ITSDDS) provides timely access to crash analyses and reports from many safety and geographic information systems tools developed by the Iowa Department of Transportation and CTRE in recent years. This is a classic example of research evolving into a valuable service for the state. The ITSDDS is funded by several agencies, noted below, to facilitate safety decision making, effective presentation of information, and education. The following organizations have utilized the ITSDDS during 2001:

Iowa Department of Transportation (Sponsor Agency)
Iowa Governor's Traffic Safety Bureau (Sponsor Agency)
Iowa Department of Public Health (Sponsor Agency)
Federal Highway Administration (Sponsor Agency)
Iowa State Patrol
Scott County Sheriffs Office
Red Oak Police Department
Council Bluffs Police Department

City of Sioux City
Black Hawk County Health Department
Iowa Statewide Traffic Records Advisory Committee
Barr-Nunn Transportation
Transtech Management
Howard R. Green Company
Snyder and Associates

Center for Portland Cement Concrete Pavement Technology

On October 6, 2000, the United States Congress recognized Iowa's role as a leader in building Portland cement concrete (PCC) pavements by appropriating up to three-quarters of a million dollars to a public-private partnership involved in PCC pavement research at Iowa State University (ISU): the Center for Portland Cement Concrete Pavement Technology (the PCC Center). The PCC Center is truly unique in that it is the first transportation research center in the country founded as a joint effort of the Portland cement concrete paving industry, a university, and a state department of transportation. The partnership includes the Iowa Concrete Paving Association (ICPA), ISU's Center for Transportation Research and Education (CTRE), and the Iowa Department of Transportation (Iowa DOT). The PCC Center operates administratively as a unit of CTRE.

In addition to technology transfer activities, the center has started, or will soon start over \$2 million in research projects. In partnership with the Office of the Vice Provost for Research and Advanced Studies, the PCC Center provided funding for and designed a new research laboratory in ISU's Town Engineering Building. The lab will open in the fall of 2001.

Statewide Urban Standard Design and Specifications for Public Improvements

In order to maximize the benefits of each dollar spent for public improvements, the Governor's Blue Ribbon Transportation Task Force in 1995 recommended the "adoption of common standards for construction specifications and construction equipment." CTRE has been working for over a year to negotiate the necessary institutional arrangements, including presentations to many regional governments around the state. Upon implementation of statewide urban standard design and specification manuals, it is estimated that over \$7 million dollars will be saved annually in the construction of public improvements. The development and implementation of the manuals will be completed by CTRE with policy guidance provided by a statewide steering committee.

Iowa Pavement Management Program (IPMP)

The IPMP is a program to help local, regional, and state transportation agencies to develop objective, consistent, and cost effective decisions regarding the maintenance, rehabilitation, and reconstruction of the highway network. Both in Iowa and in other states, it is estimated that a pavement management program can improve the effectiveness of highway investment by as much as 10%. CTRE started a series of research projects for the Iowa DOT in 1994. This led to a contract between the Iowa DOT and CTRE in 1999 to implement and operate a pavement management program under the oversight of a committee of state, county and local engineers.

- A third cycle of pavement condition and history data collection on the federal-aid-eligible (FAE) highway system in Iowa will be completed this year, covering a record 18,000 miles of paved roads.
- CTRE has contracted with 45 local government to collect condition data on city and county roads. Cities like Des Moines, Davenport, Dubuque, Urbandale, Iowa City, Carroll, and Sioux City are participating in the program. Many cities and counties are participating in the data collection. Local agencies are also taking advantage of the new Video Logging option. Des Moines, Sioux City, Iowa City, Urbandale, Newton, and Knoxville, are having their entire network filmed, which allows them to "drive" their network from their computer.
- Technology transfer and training activities continue to be the focus of the CTRE's implementation and operations tasks. Several training sessions are held every year to provide technical support, training, and technology transfer on the use of pavement management software, GIS tools designed for the IPMP, and general pavement management system information. Since 2000, about 200 transportation professionals have attended IPMP training. CTRE staff continue to visit regional transportation agencies to present the IPMP tools and services and to provide customized and hands-on training.
- CTRE has been working with the six Iowa DOT District Offices to help with the implementation and operation of the pavement management system. Hands-on training and technical support

have been provided to the districts' staff as part of the IPMP.

Introducing New Manufacturing Technologies to Iowa's Leading Companies

The Advanced Manufacturing Research and Collaboration Consortium (AMRCC) consists of the seven largest manufacturers in Iowa. The group seeks to help Iowa companies gain access to new manufacturing technologies such as rapid prototyping. ARMCC called on the Center for Advanced Technology Development to assist in developing and implementing a statewide, rapid prototyping marketing initiative. The goal of the effort is to promote rapid prototyping services in the state. To meet the goal, CATD has developed a database of prototyping, creating an awareness of the diverse and relatively numerous resources of rapid Iowa companies, a website, and marketing pieces.

Extension Staff Help Iowa Early Care Project

Faculty in the department of Human Development and Family Studies cooperated with the ISU Extension's Community Development Data Information and Analysis Laboratory (CD-DIAL) to provide technical assistance and survey information to the Iowa Early Care and Education Professional Development Project. The Project is funded by federal Head Start funds through the Iowa Department of Education, to serve 967 members who direct Iowa Head Start programs and early care centers that accept Title I educational support funds. Training and development activities are being provided by HDFS faculty to Early Care practitioners including on-site delivery, and barriers to training effectiveness have been identified. The survey results suggest that there is a critical need for paid release time for training and wage incentives for training completion. Additional information is being obtained from Iowa parents on child care affordability, accessibility, and quality.

Safe Sprouts for Iowa

An ISU researcher provided information related to his work on sprouts and the current regulatory climate to State of Iowa food inspectors to assist in their regulation of two or three seed sprouting operations in Iowa. The information was about edible sprout production and regulatory information to help make the sprouts for sale in Iowa safer for consumers.

Leadership Programs

Sociology faculty are working with faculty in the College of Design to deliver leadership programs for

the Non-profit Management Institute which includes non-profit organizations in the Des Moines area and citizen and neighborhood groups in the Des Moines enterprise community. Other leadership partnerships included representatives of the Iowa Department of Economic Development, Iowa Bankers, Iowa Farm Bureau, the Governor's office, local health groups and organizations representing Hispanic, African American and Asian populations. Emerging Iowa community leaders received training in group formation, goal setting, group dynamics, decision making, and assessing community needs and direction. Programs include Developing Dynamic Leaders and the Institute for Public Leadership.

Improving the Quality of Life

The Department of Sociology cooperated on numerous Iowa efforts to improve the quality of life in communities. The department's survey unit (CD-DIAL) worked with community leaders and citizens to develop assessment tools on health insurance (CHIPS), conservation, quality of life, childcare, housing, farmers, markets and employability of high school students with special health care needs. CD-DIAL served Trees Forever; Ames Public Library; Mason City parents; educators, employers and physicians; and Department of Public Health, Davis County leaders, Iowa Area Education Agencies, and an organization developing an Iowa African American directory.

In collaboration with the Iowa Department of Agriculture and Land Stewardship, sociologists conducted the Iowa Farm and Rural Life Poll. This year, questions focused on transgenic seeds, (Bt corn and herbicide-tolerant soybeans), production and marketing problems, and farm family quality of living. Public policy makers, media, and private stakeholders such as the seed industry and equipment dealers use the data to plan farm management and farm family interventions.

Environmentally Friendly Lane Markers

A highway lane marker developed in the degradable plastics program is being field tested by the Iowa Department of Transportation. These new degradable lane markers are an environmentally friendly and disposable alternative that eliminates the labor-intensive need to remove fixed markers before the snow plowing season.

Limestone Distribution in SE Iowa

A meteorologist consults for the Iowa Department of Transportation and Iowa industry to investigate the

distribution of limestone in potential new quarries in southeast Iowa. He also has two projects that involve the study of modern carbonate deposits in the Bahamas as an analog of ancient petroleum-bearing rock systems. Knowledge gained from these investigations will aid in petroleum exploration. Together with a geologist he also identifies areas of low rock-aggregate quality in a limestone quarry at Alden, Iowa.

Geologist Maps Sand and Gravel

Another geologist was funded by the Office of the Story County Engineer this past year to use geological and geophysical methods to locate and map accumulations of sand and gravel to be developed by the County for road maintenance. Story County's gravel reserves are currently quite low.

Performance Measurements for Public Safety

A journalist is consulting for the Iowa State University Department of Public Safety to help them reorganize their operations. He also provides training to the Iowa Department of Public Safety, helping them construct performance measurements for their divisions and bureaus. The Governor requires each state department to design such performance measurements, which are used in making budget decisions.

Faculty Member Provides Key Information to Many State Agencies

Another journalist consults for the Highway Safety Management System of the Iowa Department of Transportation. In the past year the faculty member conducted a comparative analysis of what works and what does not in highway safety campaigns across a large number of topical areas that have a mass media component. The faculty member also consults for the Partnership for a Drug-Free Iowa (PDFI), part of the Governor's Alliance on Substance Abuse. For PDFI she assessed the impact on the Iowa public-at-large of PDFI's public service announcement-based (PSA) media campaign, and also evaluated "Take Five," an educational program for parents and other adult caregivers to prevent drug use among youth in Des Moines. Finally, she has served for three years as review panelist and member of the Communication Research Design Team to develop and test methodologies for communicating with and involving the public in the deployment of innovative environmental technologies for the U.S. Department of Energy.

Political Scientist Monitors Economic Growth

A political scientist consults for the City Finance Division of the Iowa Department of Management to conduct a comparative study of Iowa city finances. He is also a member of the Board of Directors of "Iowans for a Better Future," a nonprofit, statewide organization that monitors the progress of the "Iowa 2010" plan by the Governor. He provides the Board information about ISU involvement in helping foster the economic growth of the state.